VOL. XI. No. 12 DECEMBER 1926

MECCANO MAGAZINE

THE LARGEST ARCH BRIDGE IN THE WORLD (See page 722)

6D

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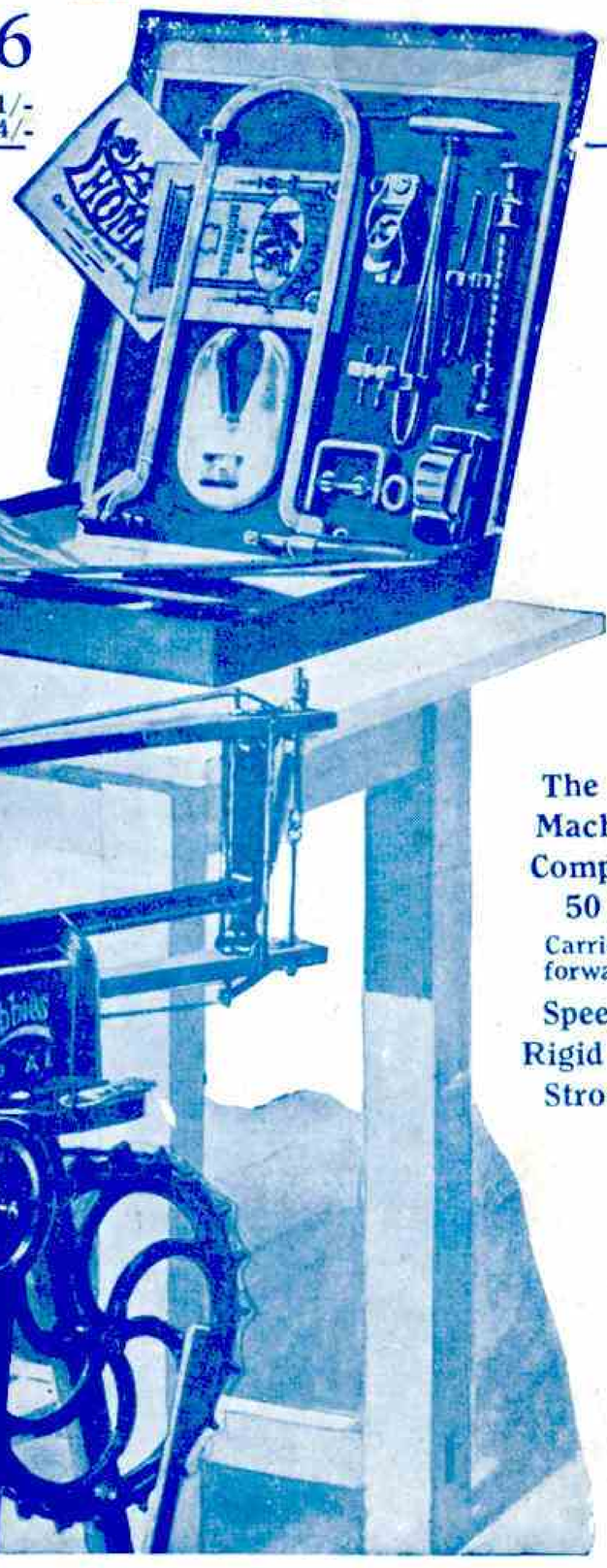
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MECCANO MAGAZINE

Editorial Office
Binns Road
Liverpool

Vol. XI. No. 12
December, 1926

With the Editor

Christmas Greetings to You All

Although Christmas will not be here for three weeks, I must take this—my only—opportunity of sending greetings to all my readers and wishing every one of you "A Very Merry Christmas." (I am not superstitious but an old Irish gipsy once told me it was very unlucky ever to use the word "happy"!). I only wish that I could pay a visit to your homes and convey my wishes personally, but this is impossible. I shall be thinking of you all on Christmas morning, however, and hope that you will have a really good time during the festive season.

Each year the great brotherhood of Meccano boys grows larger and larger, and every Christmas we make hundreds of thousands of new friends—boys who receive a Meccano Outfit or a Hornby Train as a Christmas present—each of whom finds he has great pleasure in store and many happy days ahead. I hope that readers of the "*M.M.*" will remember these new friends on Christmas morning when they broadcast, by their thoughts, a message of good-will and friendship to all Meccano boys—both young and old.

The "M.M." to be Again Enlarged

For many years past, large numbers of readers have written every month asking for the "*M.M.*" to be published weekly or for it to be made larger. At present there are many difficulties in the way of making the "*M.M.*" a weekly publication, but it has been decided to permanently enlarge it. Commencing with next month's issue, there will be a greater number of pages than usual. This will make possible the publication of many splendid articles that at present are "crowded out" each month. In addition we shall be able to have more illustrations and devote a greater amount of space to our regular features. I hope, also, to issue special numbers from time to time.

An enormous amount of research is necessary every month in connection with the articles that appear in our pages, and the tracing and collection of the photographs for the necessary illustrations is also a big task. However, we have increased our editorial staff, taken more office space, and shall in future be able to produce an even better "*M.M.*" than hitherto. In addition to our permanent staff, there are now many well-known writers contributing to our pages, and in this connection I hope to make an announcement of importance in the near future.

Obtaining the "M.M."

The price of the new "*M.M.*" will be 6d. per copy commencing with the January issue. When posted direct from this office the new subscription rates will be 4/– for six months and 8/– for 12 months. The price of the Magazine Overseas (except Canada) has been 6d. for some time past and will therefore remain unaltered.

We shall, of course, keep faith with our existing subscribers and all subscriptions received up to to-day (4th December) will be filled at the old rate until the subscriptions expire. This remark does not, however, apply to the Christmas issue. As in previous years each subscriber will be charged 8d. for this special number, which fact should be remembered when subscriptions are renewed, as they will of course, expire one issue earlier than they would have done had the subscription not included the Christmas issue.

The cost of printing the "*M.M.*" each month is now very heavy and consequently we only print sufficient copies to fill the orders in hand. Meccano dealers and newsagents who sell the "*M.M.*" send us their orders for the next month's supply two or three weeks before publication date and all these orders are totalled and a corresponding number of Magazines printed. It is important, therefore, that every reader should place a regular order for the Magazine with his Meccano dealer or newsagent unless he subscribes direct to this office, as otherwise there will not be sufficient copies to supply all demands—which will mean several readers being disappointed. If, therefore, any reader has not already placed a regular order for the Magazine he should do so without delay.

There should be no difficulty whatever in obtaining regular copies of the "*Meccano Magazine*" from any Meccano dealer or newsagent. If difficulty is experienced by any reader and he will write to me giving particulars and the name and address of his dealer or newsagent, I will at once take up the matter on his behalf.

Accuracy in Measuring

When your mother or sister buys 1¼ yards (!) of dress material for a summer dress, I am sure that she watches closely to see that she is not given short measure—for even an inch or two in such an order probably would have disastrous results! As her eagle-eye watches the assistant, she little thinks of the difficulties that have been entailed in establishing a standard yard measure, the method of determining the length of which is considered of such importance as to merit a special Act of Parliament.

The Act provides that if the standard measure is lost or destroyed the correct length of a new yard measure shall be determined by measuring the length of a pendulum that is swinging from side to side once every second. The measurement is to be made at sea level, in a vacuum, and in the latitude of London. This last provision was made because a body changes its weight as it changes its distance from the centre of the Earth. We all know that the Earth is not a perfect sphere, but slightly flattened at the Poles, which are, as a matter of fact, 26 miles nearer the Earth's centre than the Equator. It naturally follows that the further a pendulum north or south of the Equator the faster will be the swing.

Importance of Being Accurate

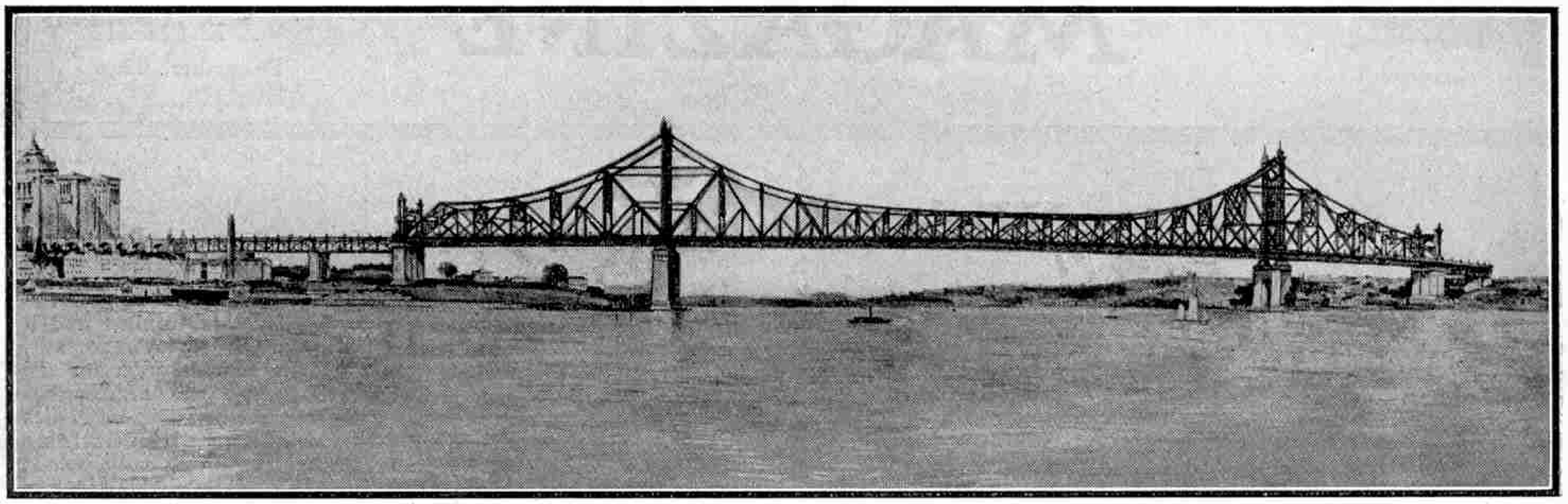
To carry out the task as laid down by the Act would certainly be difficult, if not impossible. Thus, when the standard yard measure, which was kept in the Houses of Parliament, was destroyed by fire when the building was burnt down in 1834, it was decided that it would be considerably easier to replace the standard yard measure simply by making another copy of an existing yard measure that had itself been copied from the one destroyed! Since that time three other copies of the standard yard measure have been made, and one of them will be seen by the observant reader fixed in a wall in Trafalgar Square.

All this attention to detail may seem very unnecessary to some people, but as all yard measures should correspond with the standard measure, it is of the greatest importance that this measure should be accurate. If it varied even a fraction of an inch, that variation would represent a very large sum, either loss or profit, in the incorrect measurement of the millions of yards of material and other measured stuffs that are measured out every month.

The yard and other measures are indeed of equal importance to the standard weights, for if the standard pound weight had, say, one-quarter of an ounce taken off it, we can quite imagine that the accumulative results in buying and selling goods by weight would have very considerable consequences even in a week—to say nothing of a century!

Largest Arch Bridge in the World

Over 50,000 Tons of Steel to Span Sydney Harbour



As it would have been with the original design for a cantilever bridge

THE suggestion to bridge Sydney Harbour seems to have been made first in 1815—the year of Waterloo—when Francis H. Greenway, then Government Architect, brought a scheme before the notice of Governor Macquarie. Some years later, in a letter to the press, Greenway wrote:—"... in the event of the bridge being thrown across from Dawes' Battery to the North Shore, a town would be built on that shore, and would have formed with these buildings a grand whole that would have indeed surprised anyone on entering the harbour, and have given an idea of strength and magnificence that would have reflected credit and glory on the Colony and the Mother Country."

It is evident that the idea was the subject of a good deal of discussion even in those early days, for there is preserved in the Government Records at Sydney a minute of 1875 in which the Under Secretary for Works expresses the opinion that "No doubt the bridge would soon be an accomplished fact." Obviously this gentleman was an optimist!

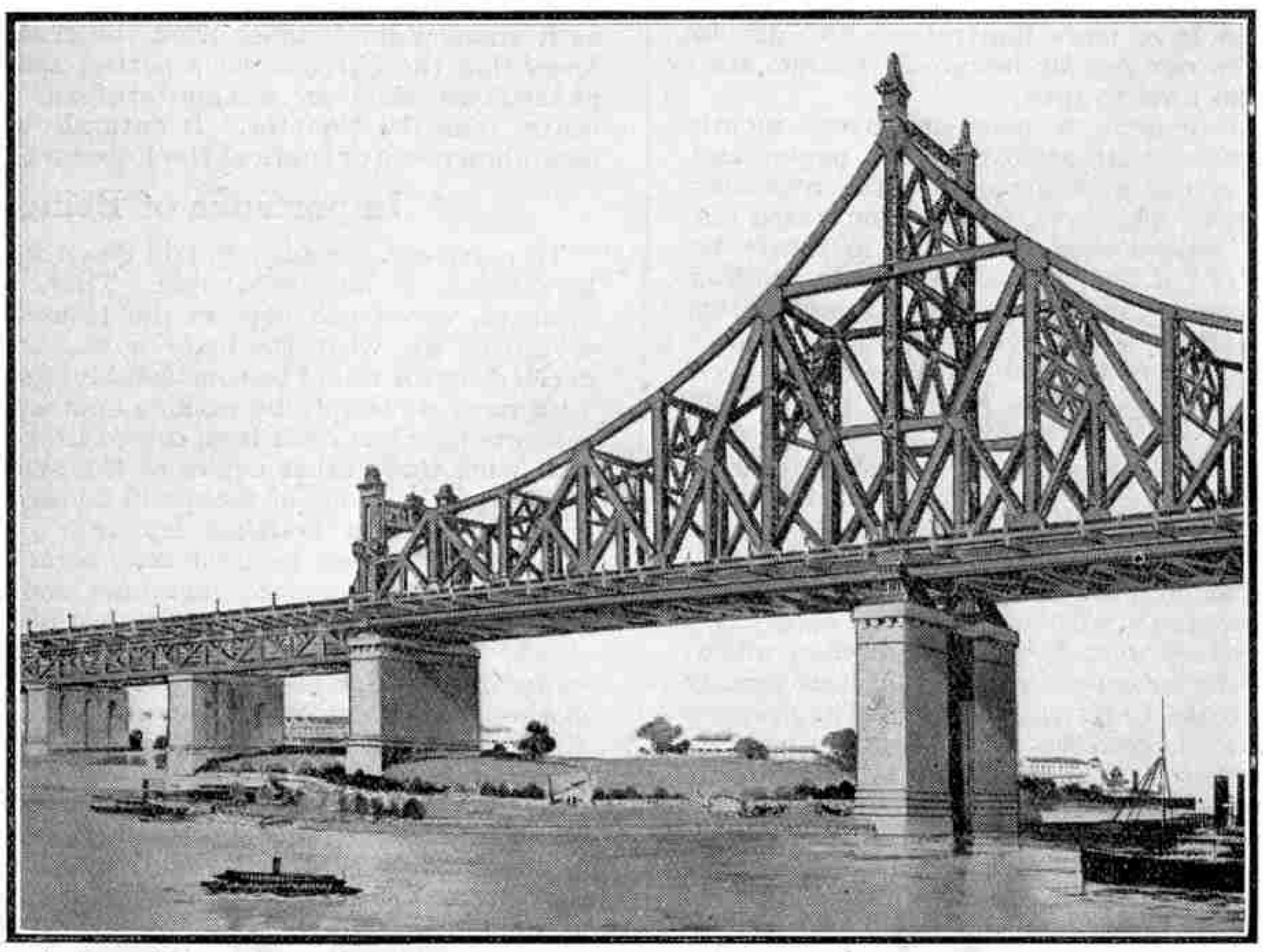
Many times since then politicians and statesmen have not only hoped that the bridge would soon be an "accomplished fact," but in their election speeches have even gone to the extent of promising their supporters its immediate construction!

The first recorded design seems to have been prepared in 1857 by one Peter Henderson and at a more favourable time it is possible that his bridge might have been built. His scheme could not survive the local opposition, however, based upon the fear that if two bullock wagons happened to meet in the centre the structure might collapse!

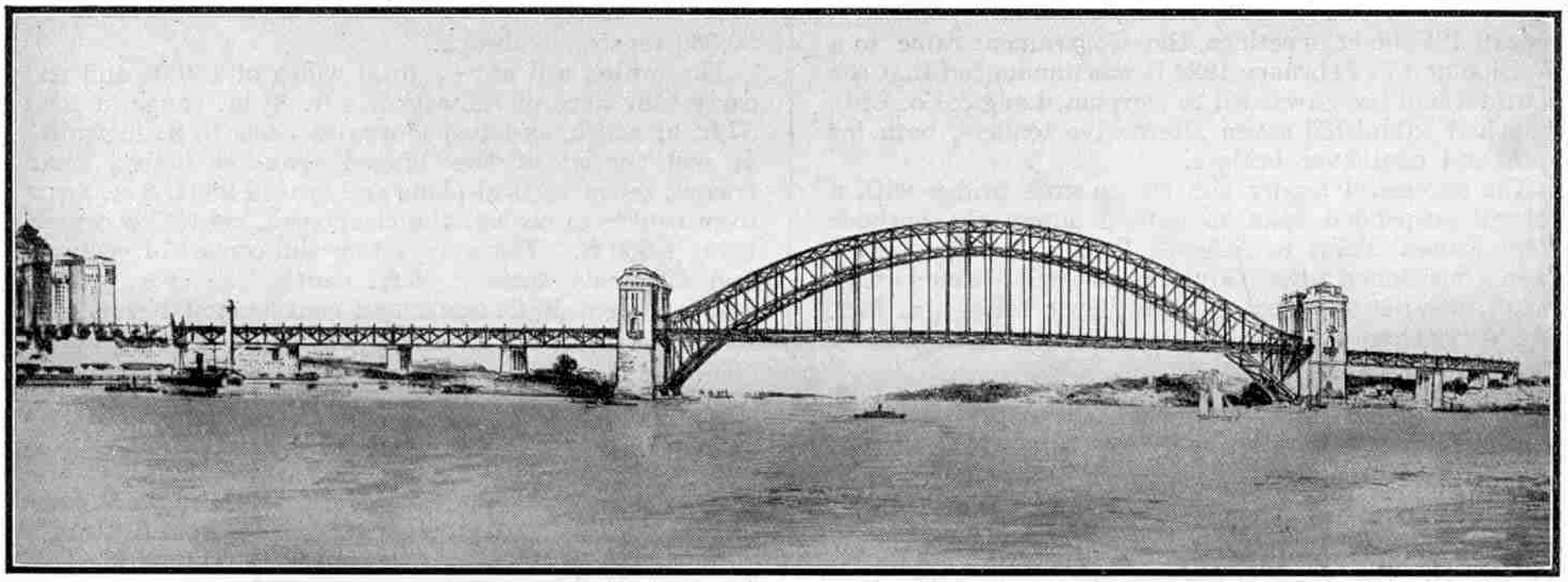
Shall it be a Bridge or a Tunnel?

The question of a bridge was brought up repeatedly at intervals as the years went on, but always without practical result. From time to time engineers were consulted and architects prepared drawings, but the actual bridge remained as far off as ever. Year by year the city of Sydney was developing at an enormous rate and the necessity of doing something in regard to improving cross-harbour communication became increasingly evident.

In 1912 a Public Works Committee was appointed to consider the whole question of connecting the two shores either by bridge or tunnel, and to ascertain the estimated cost of whichever undertaking they decided to be the best. The idea of a tunnel or sub-



As it would have been with the cantilever bridge. The south approach, showing piers and abutments



As it will be—the alternative arch bridge in position, and dominating the Harbour

way was very popular at first, but it was abandoned when it was realised that a tunnel beneath the harbour would mean that no vessels having a draught of more than 38 or 39 ft. would be able to enter the roadstead. On the other hand the lie of the surrounding land, which rises rapidly on both sides of the harbour, was particularly suited to the construction of a bridge, and in addition the distance would be three-quarters of a mile less by bridge than by subway and the inevitable gradients would be much easier.

Finally on 18th July 1913, the Committee, having examined carefully all the schemes submitted to them, passed a resolution advising the construction of a cantilever bridge to join Sydney and North Sydney. The plans recommended for the proposed bridge were those prepared by Dr. J. J. C. Bradfield, M.E., M.I.C.E., who at that time was Chief Engineer of the Metropolitan Railway Construction, Public Works Department, New South Wales. Subsequently the New South Wales Government appointed Dr. Bradfield to be Chief Engineer for the Sydney Harbour Bridge.

The Suggested Cantilever Bridge

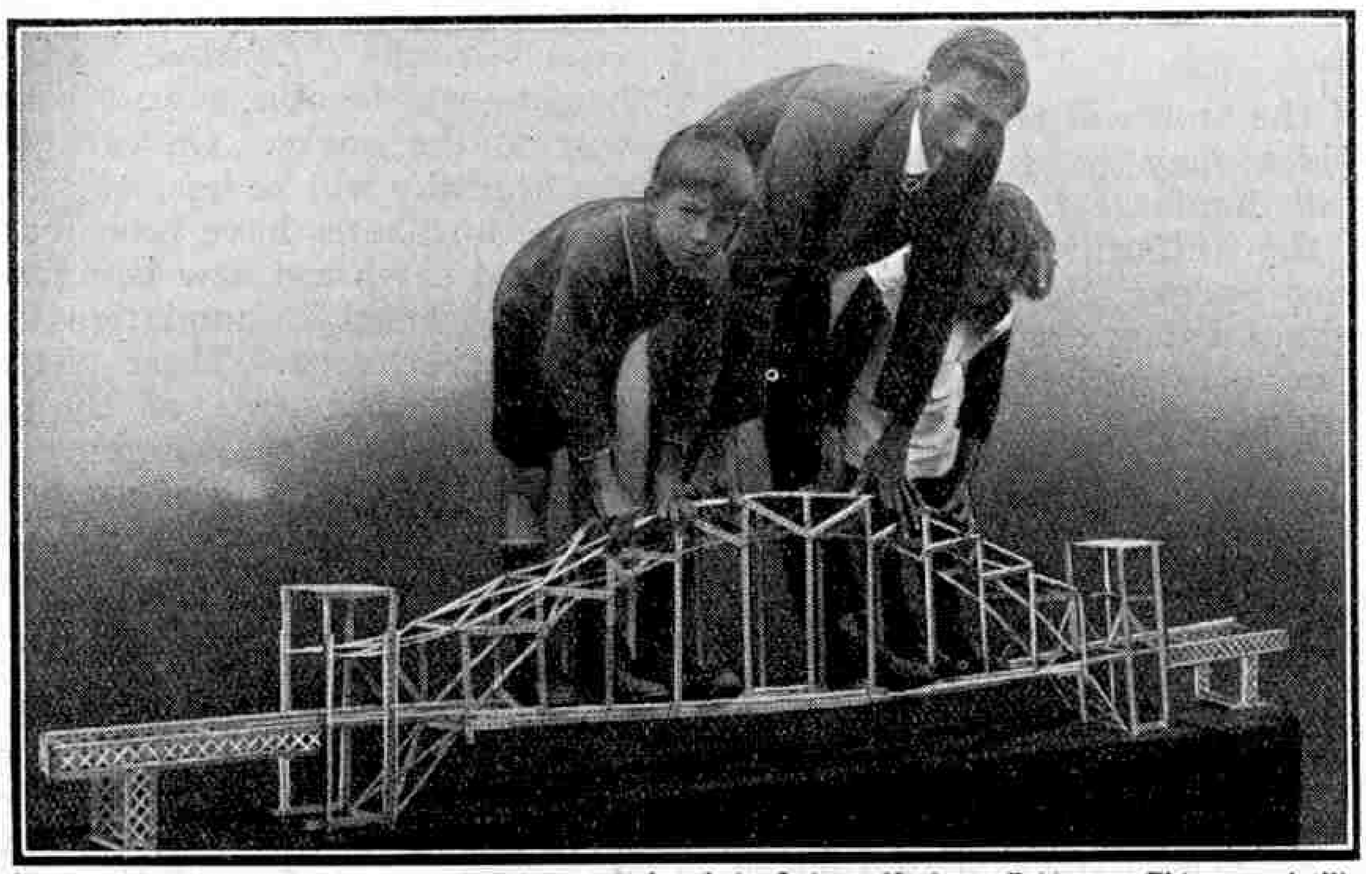
The original plans for this cantilever bridge, afterwards superseded by the arch bridge now under construction, were for steel cantilevers spaced 98 ft. 6 in. apart, centre to centre, with shore and harbour arms each 500 ft. in length. The harbour arms were to support a 600 ft. central span and the clear span from centre to centre of main piers was to be 1,600 ft.

The clear and suspended spans were to be "M" braced, with each main panel divided into four, the cross girders being pitched 37 ft. 6 in. and 50 ft. apart, and cantilevered beyond the main girders to carry the railway and the footways. Wind-bracing and sway-bracings were also to be provided.

The three spans of the southern approach were to consist of four "M" type deck trusses with subdivided panels, 204 ft. in length, centre to centre, and spaced 33 ft. apart transversely. The three spans of the northern approach were to have been similar to those on the southern, except that the former were to be on a curve of eight chains radius. The total length of the main bridge and approaches was to have been 3,810 ft.

Thus the matter stood on the outbreak of war. The scheme had then perforce to be postponed, and the ferry boat remained as before the only means of crossing the harbour.

By 1921 the traffic across the harbour had increased from 16½ million to 42 million passengers, and it was admitted on all sides that something must be done at once. The bridge question was reopened and in the following year the Government of New South Wales passed an Act authorising the construction of a bridge to cross the harbour in one span, at a height sufficient to allow the passage of the largest ocean liners.



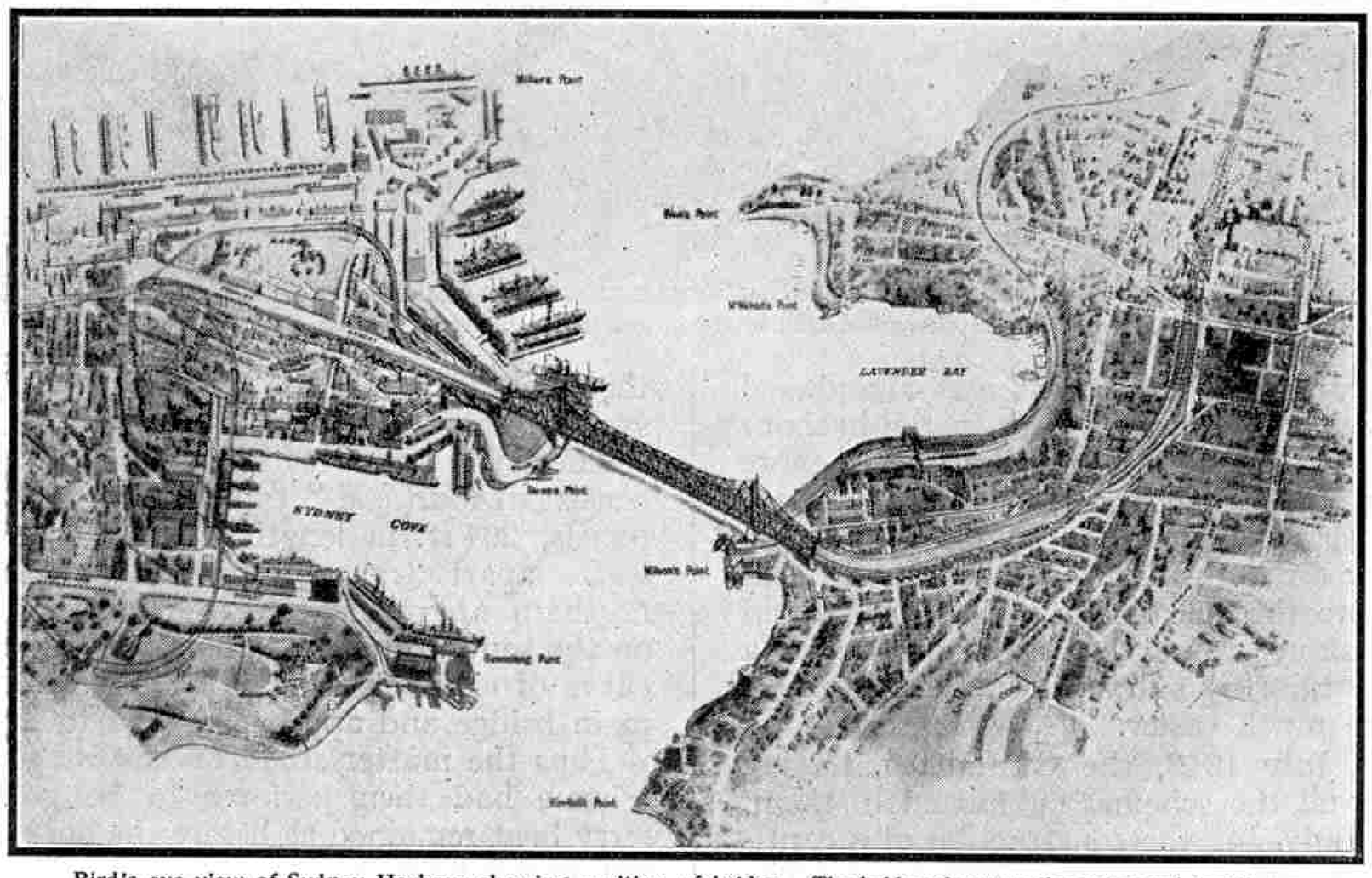
Already Meccano enthusiasts are building models of the Sydney Harbour Bridge. This one, built by Everard J. Earl of Sydney, is strong enough to bear the weight of its builder, his sister and his father, showing that the model is constructed on correct engineering principles

Decision to Build an Arch Bridge

The general design and exact position of the bridge, together with the dimensions, etc., were defined by a specification drawn up by Dr. Bradfield, and competitive tenders were invited from a number of engineering firms in all parts of the world. Two British firms—Sir Wm. Arrol & Co. Ltd., the builders of the Forth Bridge, and Dorman, Long & Co. Ltd., of Middlesbrough—were given a 10 per cent. preference over any foreign rivals, but in spite of this the competition was very keen. After careful examination of the tenders and designs, and after

repeated Cabinet meetings, the Government came to a decision and in February 1924 it was announced that the contract had been awarded to Dorman, Long & Co. Ltd., who had submitted seven alternative tenders, both for arch and cantilever bridges.

The successful tender was for an arch bridge with a central suspended span to extend across the harbour from Dawes' Point to Milson's Point. As has already been mentioned, the Government had leaned very much towards the idea of a cantilever bridge—in fact, the original specifications called for a cantilever solely. The suggestion for an arch bridge was advanced partly on the ground that the cost would be appreciably less, and also because it was believed that the arch type would present a more pleasing appearance. This, of course, is certainly an important factor to our Australian cousins, who proudly claim that Sydney Harbour is the most beautiful in the world.



Bird's eye view of Sydney Harbour showing position of bridge. The bridge shown is the suggested cantilever, now superseded by an arch bridge

To be Completed in 1931

As the highest point of the arch will be 450 ft. above high-water level, some idea may be gained of how enormously the bridge will dominate the harbour. In selecting the arch type the authorities have ensured that the traveller entering Sydney Harbour from the sea will be met by the sight of a giant bridge well worthy to rank with the finest of any other country in the world.

The Sydney Harbour Bridge will be by far the largest arch bridge in the world, its nearest rival (Hell Gate Bridge, New York) having a span of about 1,000 ft. It will, indeed, be the third largest bridge in the world, irrespective of type, the two larger being, of course, the Quebec and the Forth cantilever bridges.

The contract stipulates that constructional operations are to be carried on simultaneously on both sides of the harbour, and the time limit for the work is fixed at six years from the date of notification of acceptance of the tender, unless, of course, a special extension of time is granted by the Australian Government.

Materials to be Used

The question of a steady and assured supply of materials is invariably of first importance in the carrying out of so vast an undertaking. In this respect Dorman, Long & Co. Ltd. are particularly fortunate, for some years ago they established constructional works at Sydney and Melbourne. Although the greater part of the heavy steel plates used will be manufactured at the contractors' own works in England, the terms of the contract require that certain of the lighter materials shall be of Australian origin. In all there will be over 50,300 tons of steelwork.

The bridge will have a total width of 150 ft. and will carry four lines of railway of 4 ft. 8½ in. gauge, a road 57 ft. in width, and two footpaths each 10 ft. in width. It will consist of two hinged spandrel braced main trusses, set in vertical plane and spaced 98 ft. 6 in. apart from centre to centre, the clear span, centre to centre, being 1,650 ft. The web system will consist of verticals and diagonals forming 50 ft. panels, the cross girders being pitched 50 ft. apart and cantilevered beyond the main trusses to carry one railway track and a 10 ft. pathway.

Granite to come from Australian Quarries

The total length of the arch and bridge spans is to be 3,770 ft., and the height to the top of the arch will be 450 ft. above high water. The central 600 ft. span will have a clearance of 170 ft. above the water at mean high tides, so that practically all large ships—with the exception of such vessels as the "*Olympic*," whose masts are 202 ft. in height—will be able to pass beneath the bridge on their way to the docks. On each side of the central span the headway will be less, as it follows the railway grade.

The foreshores have been reclaimed and 40,000 cubic yards of earth are now being excavated to make room for the piers, the foundations for which are being laid on the solid rock. These piers, as well as the anchor piers and abutments of the approach spans, are to be constructed of concrete or re-inforced concrete, faced with granite ashlar masonry. Ornamental portals are to be built at each end of the main bridge.

The masonry pylons are to be 93 ft. by 50 ft. at deck level, tapering to 75 ft. at their summit which will reach 285 ft. above high-water level.

For the pylons, piers and abutments, granite is being obtained from Moruya, on the South Coast of New South Wales. Here the quarries, which are being worked by the contractors, will produce 30,000 cubic yards of granite for facings and will keep 150 men employed for five years. The southern approaches of the bridge will absorb 50,000 cubic yards of sand and 100,000 cubic yards of granite material. Over 1,000,000 ft. super. of ironbark, grey gun and Oregon pine will be required, and also 30,000 tons of cement.

The deck of the bridge will be very firmly laid as it has to stand very heavy strains from both road and railway traffic. The roadway will consist of $\frac{3}{8}$ in. buckled plates, and the footway of $\frac{5}{16}$ in. buckled plates, supported on transverse rolled steel joists resting on steel stringers. Coke concrete will then be laid to a thickness of 3 in. from the top of the buckled plates.

(To be continued)

Buying a Dynamo

A True Story, by J.H.M.

I KNOW quite a lot about Electricity. For instance, I always re-charge our bell batteries myself with that salammoniac stuff, and so save the fee of the professional electrician, whom I only call in when the intricate mechanism of the bell itself goes wrong.

My son of eleven knows even more about Electricity than I do. The other day he coached me very carefully regarding the most important points of a small dynamo that I had promised to buy him. But I relied upon memorising those points instead of making notes, because that would have exposed my confusion of mind in regard to the electrical information he is constantly imparting to me. . . . However, I felt quite confident as I entered the shop to which I had been told to go.

"A small dynamo, please—for lighting electric lamps," I said airily.

"How many watts?" the young man enquired.

"Don't be rude," I said severely. "'How many whats' indeed. I spoke quite plainly—one small dynamo."

"But do you want to light 2 watt lamps, or 4 watts, or what watts?"

"Oh—watts! Yes, quite! Well—er—justaboutthe usual number you know. I'm not quite sure."

"Well, do you know what voltage it's to be—how many volts?"



"H'm!" I remarked . . . . . "Where's the handle?"

"How many volts?" I repeated vaguely, my confidence rapidly evaporating. "Yes, he'll want some volts, of course. It's for my son, you see—you'd better give me enough to keep him going for some time."

He looked at me curiously and seemed to be trying to swallow something he couldn't get down.

"That's a useful little thing," he said suddenly, putting a diminutive object on the counter. "Three pounds ten."

"Ah!" I said, turning it about for examination as if to make sure it was all it should be. "Rather too much—I want something about a guinea."

He then produced a thing about the size of an egg, and backed it up with a brief: "Nineteen-an'-six."

"H'm," I remarked thoughtfully, repeating the "examining" process. "Where's the handle."

"What handle?"

"Don't you have to turn these things so many hundred times an hour to get electricity out of them?"

I was determined to show him I knew something about it.

"You have to turn that one four thousand times a minute to get anything out of it. That little pulley has to be connected with a machine of some sort."

I hedged.

"Oh—one of that type is it? I'm more used to the older kind. Well, I suppose it will do—it's only for a boy. It has plenty of vampires, I suppose?"

"Vampires?" he queried, blankly. Then, with sudden inspiration: "I suppose you mean *amperes*."

"I *said* amperes. Do you think I don't know what an ampere is?"

He maintained a stony silence.

"Well—you haven't told me if it has a good supply of AMPERES!"

"It's 4 volts 1 ampere," he replied stolidly; then after a pause he added: "Nineteen-an'-six."

"Pity you couldn't tell me so at first," I said sharply, "without all that argument."

He did not reply, so I said I would have the dynamo, and told him to be sure and put plenty of volts and amperes in with it.

He made a strange noise that was half way between a choke and a sneeze, and for a moment I thought he was going to argue again. But he thought better of it and replied quite politely.

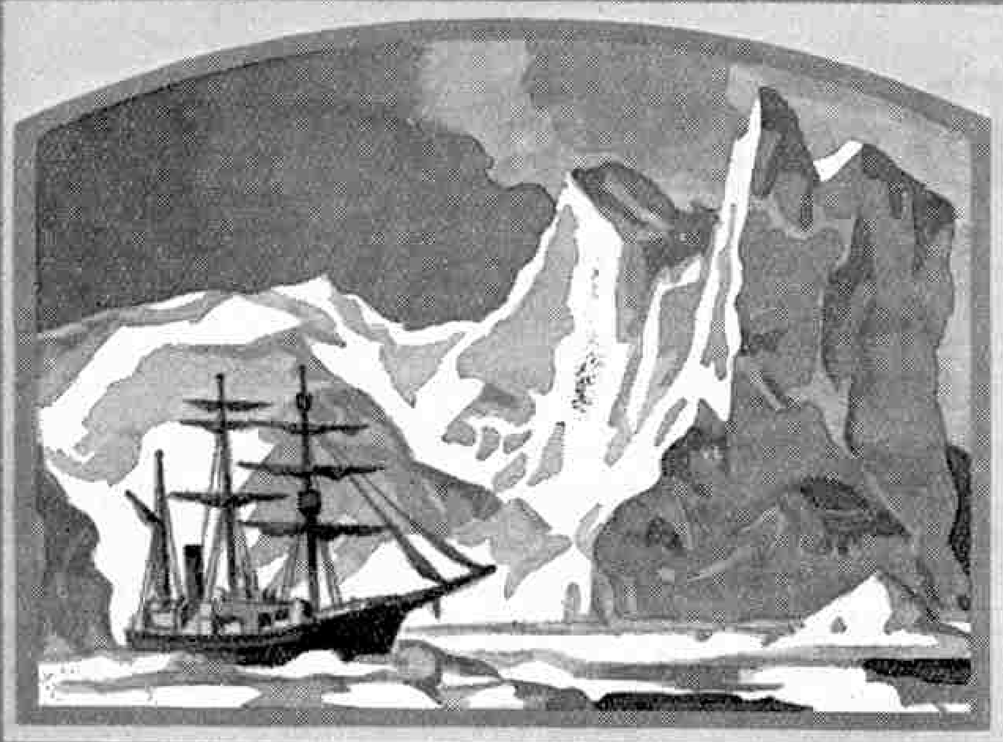
"We always keep them ready packed inside the dynamo, sir. It keeps them dry. Tell your son to count them and if there are any short we will make good the shortage with pleasure."

I concluded from his sudden change of manner that he realised I knew something about dynamos, and was not to be trifled with, but I had some misgivings on that point when I reached home.

My son at once plied me with eager questions as to how I had managed and had I bought his dynamo.

"Oh, yes," I said casually, "there's no difficulty about buying a dynamo if you know what you're doing!"

As I gave him the dynamo I delivered the assistant's message and to my astonishment he promptly went off into outrageous shouts of laughter, and refused to tell me what he was laughing about!



EXPLORING THE ARCTIC

Famous Explorers and their Attempts to Reach the Pole.

IV. THE TRAGEDY OF HENRY HUDSON

THE next Englishman to undertake Arctic Exploration was Henry Hudson who was, perhaps, a grandson of Alderman Henry Hudson, one of the founders of the Muscovy Company, with some of the activities of which we have already dealt.

Very little is known about Hudson's early life, but he probably belonged to an influential family, who were interested in developing trade with Russia. If this is so, it is more than likely that during his early years Henry lived in an atmosphere of commercial enterprise. No doubt he often stood on the banks of the Thames and watched the ships loading and unloading their strange merchandise brought from foreign countries, and possibly also some of his kinsmen told him of their wonderful adventures across the sea.

Whether this is the case or not, there is no doubt that young Hudson was fired with the spirit of adventure, and it seems certain that he sailed on several voyages before undertaking the first of the four Arctic voyages that have won him immortal fame.

It is not at all unlikely that Hudson served his apprenticeship with the Muscovy Company, which—as has already been explained—existed for the purpose of developing trade with Russia and in northern waters. We do know that the Muscovy Company were interested in training young men for service in Russia as their agents, and also educating others in the difficult art of navigation. A rare document, printed in 1516, tells us of this and we learn that "the fleet that went ordinarily to Russia entertained three or four novices in a ship, and so bred them up seamen, which might make up the whole some four score men yearly."

Hudson's grandfather's name first appears on a charter granted in 1555 by Queen Mary to the Company of Merchant Adventurers. This was organised by Cabot, who had suggested the possibility of discovering a north west passage across the Polar Regions to the distant land of China. Since Cabot's suggestion, however, the Muscovy Company had established a profitable trade with Russia, and although the company was not now so eager to discover the north west passage and so open up new trading grounds, a search for the passage was still regarded as desirable.



Henry Hudson

With this object in view Henry Hudson, the younger, was placed in charge of an expedition consisting of a small vessel and a crew of twelve men. It is on record that on the 19th April 1607, he took the sacrament at St. Ethelburga's, in Bishopsgate Street, London, with his son, who was to accompany him on the voyage and who is described as "John Hudson; a boy."

Hudson sailed from Gravesend in the "*Hopewell*," a vessel of 80 tons, on the 1st May, outward bound for China and Japan by way of the North Pole. He sailed up the east coast of Greenland and meeting with the ice-barrier turned off at about Franzjosef Fjord. From here he sailed east, skirting the edge of the ice to Spitzbergen, round Prince Charles' Foreland and northwards passed Hakluyt Headland, so named by him, until he reached 80° 23′. He named the most northerly point of Greenland "Hold with Hope." Here he saw many whales but found his passage blocked by the ice, and after convincing himself that there was no passage to the north in this part of the Arctic, he sailed south. After touching at Bear Island and calling at Jan Mayen Islands, he returned home and dropped anchor in the Thames on the 15th September.

The voyage had occupied three-and-a-half months, and its results were of enormous value to the Muscovy

Company. Not only had Hudson established a record by reaching 80° 23′N. but his voyage opened up these regions for whale-fishing and walrus-hunting, an enterprise that proved of great commercial value. Considering that the daring sailor carried out his explorations in a cockboat—which was little better than a small half-decked fishing vessel—with a crew of ten men and a boy, the results achieved were marvellous.

In the following year Hudson made a second voyage, again attempting to reach China by way of the Arctic, but the voyage was doomed to failure at the outset for it commenced two months too early. The explorer passed the North Cape, however, and reached the impenetrable ice-barrier, along the edge of which he sailed until he arrived at Nova Zembla on the 27th June, 1608. He made observations in these regions and attempted to round Cape Tavin hoping thus to enter the Pacific Ocean. Stormy weather caused him to decide to "save victuall, wages and tackle by a speedie return, and not by foolish rashnesse, the time being wasted, to lay more charge upon the action than necessitie should compell."

Skirting the ice-pack for some considerable distance, he endeavoured to get to the north and enter the Kara Sea by way of the Orange Islands. Finding this impracticable, however, he turned southwards to the Kosting Shar, which was marked as a strait on the Dutch map he had with him. He found the strait to be incorrectly drawn, however, as it should have been shown as a bay. Had he been able to go a little further north than he did, he would have found that Nova Zembla is divided by a narrow channel. As it was he records that "all the land of Nova Zembla that we have yet seen is to a man's eye a pleasant land. There is much main high land and with no snow on it, looking in some places green, and deer feeding thereon; and the hills are partly covered with snow and partly bare." His men reported on the 2nd July that they had seen "a herd of white deer, ten in a company," and in proof they brought on board a white lock of deer's hair.

On his return to England Hudson met with a cold reception, for he had discovered nothing that could be regarded as likely to be profitable to the Muscovy Company, who refused to finance a third expedition.

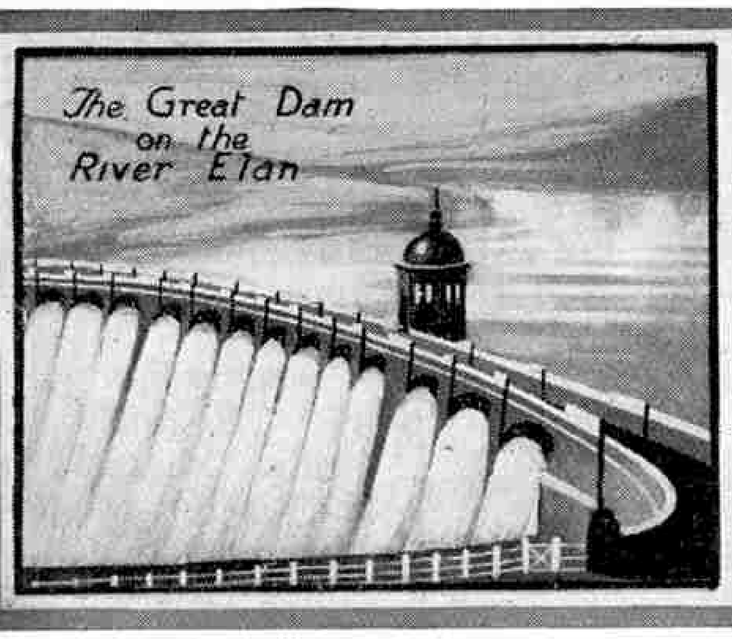


Map showing location of Hudson Bay and Baffin Land

His daring voyages had now spread his fame abroad, however, and he was approached by the Dutch East India Company to undertake a third voyage. At this time Holland as a nation was fast rising in power, and the Dutch were seeking every opportunity of extending their foreign trade. For their subsequent strong foothold in the New World they owe a great deal to this third voyage of Hudson.

Early in April 1609, he set sail from Amsterdam with two vessels, the "*Good Hope*" and the "*Half Moon*," being himself in the latter. The ships rounded the North Cape on the 5th May, but almost from the beginning of the voyage there was trouble among his crew. They complained of the hardships they were being called upon to endure amidst the snow and ice, and Hudson therefore changed his course and sailed westwards towards Newfoundland. He made directly for the mouth of the great river that now bears his name, and which at the time of his visit was British territory. As the crew of the "*Good Hope*" decided to return home when near the Newfoundland coast, Hudson was left with the "*Half Moon*" on which he had an unhappy time, for the crew practically ordered him to sail where they wished! Despite this handicap, however, he managed to make some important discoveries, cruising up and down the east coast of North America and endeavouring to make friends with the Indians. He sailed for a considerable distance up the Hudson river and came to the conclusion that he was actually the first to explore it, although we now know that the river had already been marked on maps, having been discovered by Verrazano in 1524. In his account of this voyage he describes a shoal in what is now New York Bay, which was swarming with lobsters!

On his return to Holland, Hudson was offered very unsatisfactory terms for another voyage, and so he returned to England. He was soon afloat again, however, and accompanied by his young son John, he set sail (on 17th April, 1610) on his fourth and last voyage, which voyage appears to have been financed by three private gentlemen. This time Hudson was in the "*Discovery*," a vessel of 55 tons equipped for a winter in the ice, and the object of the expedition was once again to try to find the northwest passage to China. (*Cont. on page 757*)



Engineering News of the Month

Henry Ford as Shipbreaker

The elimination of waste has long been one of the secrets of success in the factories controlled by Henry Ford, the famous American motor manufacturer. A striking example of his methods is the manner in which he is breaking up 199 U.S. Government ships that have been lying idle since the end of the war.

These ships were purchased at a rate slightly less than 5/– per ton, and 500 men are engaged in the dismantling operations. Not a scrap of material is being thrown aside. The metal and wooden parts are being used in the manufacture of motor cars and tractors, for boxes, and various packing materials. The searchlights are being transferred to the Ford aerodromes, and the engines eventually will form power-generating units in the factories. Even the experience gained in the course of the work will be useful to the company in the operation of its own fleet of steamers.

* * * *

First "Named" Submarine

The first submarine of the British Navy to bear a name, as distinct from the customary identification marking of a class letter and number, is H.M.S. "*Oberon.*" She is the newest addition to the fleet, having been commissioned in September last.

The "*Oberon*" was built at Chatham and was commenced in March, 1924. Details of her construction are, of course, secret, but it is known that she has a surface displacement of 1,480 tons and a submerged displacement of 1,750 tons. On this basis she is barely half the size of the recently-completed experimental submarine "*X 1.*," but is considerably bigger than the submarines of the "L" class, which includes the bulk of the Navy's under-sea craft.

H.M.S. "*Oberon*" is the first ship of what is to be known as the "O" class, and two other submarines of that class are being built for the Royal Australian Navy.

* * * *

New Structural Steel

After many years of experiment, a rolling process that will produce a satisfactory light-weight steel has been perfected in a Pittsburg steelworks. The steel produced by the new process, while very light in weight, is stronger proportionally than ordinary steel, and can be used in the erection of small houses just as heavier steel is employed on large buildings. The steel is sufficiently strong to permit of its being employed for roof principals and floor joists.

Tilbury Dry Dock

In our October issue reference was made to the big extension programme being put in hand at Tilbury Docks by the Port of London Authority. We now learn that the contract for the 750 ft. dry dock included in the scheme has been let to Sir Robert McAlpine & Sons Ltd. The work on this section of the scheme will occupy between four and five years.

* * * *

Salvaging the "*Hindenburg*"

In our September notes we referred to the progress of the work on the scuttled German battleship "*Hindenburg,*" lying in Scapa Flow. Messrs. Cox and Danks had hoped to raise and beach this ship before the bad autumn weather made further work impossible, but owing to a mishap at a critical moment it was found necessary to cease operations and allow the ship to sink again.

Two water-tube boilers operating the generators supplying current to the pumps placed at the bottom of the ship, unexpectedly failed, and despite every effort it was impossible to raise enough steam to carry on the work. In addition a violent storm was raging, and it was decided to defer the final lifting operations until next spring.

* * * *

Great Steel Trust

After many years of bitter competition, involving almost ruinously cut prices, several of the largest of the Continental ironmasters have decided to conclude a working agreement whereby all their iron, steel and coke-producing plants will be run under an output pooling system. The preliminary scheme limits the output of iron and steel of the respective countries participating to the following quantities :— France, 8,000,000 tons; Germany, 10,000,000 to 11,000,000 tons; Belgium, 282,000 tons; Luxembourg, approximately 273,000 tons.

The object of the arrangement is to avoid the price reductions inevitably associated with over-production, and the quotas have been fixed on the basis of present figures of production. Only one or two important manufacturers remain outside the agreement and it is anticipated that eventually they will place themselves within the combine. The smooth working of the agreement is to be secured by the creation of a common fund into which a percentage of the value of each ton of steel manufactured by him will be paid by the individual manufacturer. This payment will be approximately 4s. per ton. For each ton manufactured over his allotted quantity a manufacturer will pay 16s. to the fund, while for each ton below his quota he will draw 8s.

Electric Power in Tibet

An electric power house has been established at Lhasa, the "Forbidden City" of Tibet, to which very few Europeans have been admitted. Behind this bare statement lies a romantic story of pioneering persistence. Tibet, as most of our readers are aware, is the home of a race of people whose religion is almost the sole aim of their lives and who maintain a Spartan-like primitiveness in their mode of life that is difficult to appreciate by those who have had no direct evidence. Nevertheless, it is a Tibetan who has taken such a great step towards modernising this mysterious land.

Mr. R. D. Ringang is one of a very small band of Tibetans who have been educated outside their own country, and while at school at Rugby he conceived the plan of utilising the water power of Tibet to produce electricity. Later he passed through a college of electrical engineering and, before leaving England in 1924, became a qualified electrical engineer. In the meantime the interest of friends in Tibet had been aroused and sufficient funds were forthcoming to purchase plant. The whole of the equipment had to be transported from England and through the mountainous districts of Northern India in small parts. The task of assembling and erecting the installation must have been tremendous, for Mr. Ringang probably was the only Tibetan who had any knowledge of the subject at the commencement of the work.

A waterfall some eight miles from Lhasa has been harnessed and power is being transmitted to the coining plant in the Tibetan Mint, and to the Palace of the Grand Lama, the High Priest and ruler of the country. Later Mr. Ringang hopes to instal electric power in various small factories, with a view to establishing industries which, he believes, can profitably be worked in Tibet. This programme can only be carried out by degrees, however, for tradition dies hard, and religious influences present obstacles that must be treated reverently.

* * * *

The New Queensferry Bridge

For over 30 years vehicular traffic crossing the bridge over the river Dee has been required to pay a toll. With the opening of the new bridge that has been built to replace the existing structure the levying of tolls will cease.

The new bridge has two spans and can be opened to allow vessels to pass. The total cost has been £100,000 and is being borne equally by the Ministry of Transport and the Flintshire County Council.

"Beam" Wireless

The first of the Imperial "beam" wireless services was recently put into operation between London and Canada, and it is anticipated that similar services to Australia, India and South Africa will be available before the end of this year. Later there will be services to the United States and South America.

Several stations already have been erected in this country for beam radio working and those at Bodmin and Grimsby will transmit to Canada and South Africa, while Bridgwater and Skegness will receive. Grimsby and Skegness will deal also with the Indian and Australian traffic. Another station will be erected at Dorchester for the American work and this station will be worked by the Marconi Company under license from the Post Office, which will work the remaining English stations. The overseas stations will be controlled by the Marconi Company.

Apart from the comparative freedom from "fading" that is an advantage of the short wave lengths used in the beam system, this method of transmission requires only a very low power for successful operation and, above all, secures a degree of privacy that hitherto has been unattainable. Messages will be practically immune from interception, since only special apparatus erected on the direct line between the sending and the receiving stations can pick up the transmission. This feature is achieved by concentrating the electrical impulses in a straight line by the use of reflectors that confine the waves within an angle of from 10° to 11°. The transmitter is aimed in the desired direction and it has been found that less than 5 per cent. of the energy finds its way out of the beam.

During tests, the speed of the transmission of the messages was as high as 1,200 words per minute and, over seven days, the average speed was 600 words per minute.

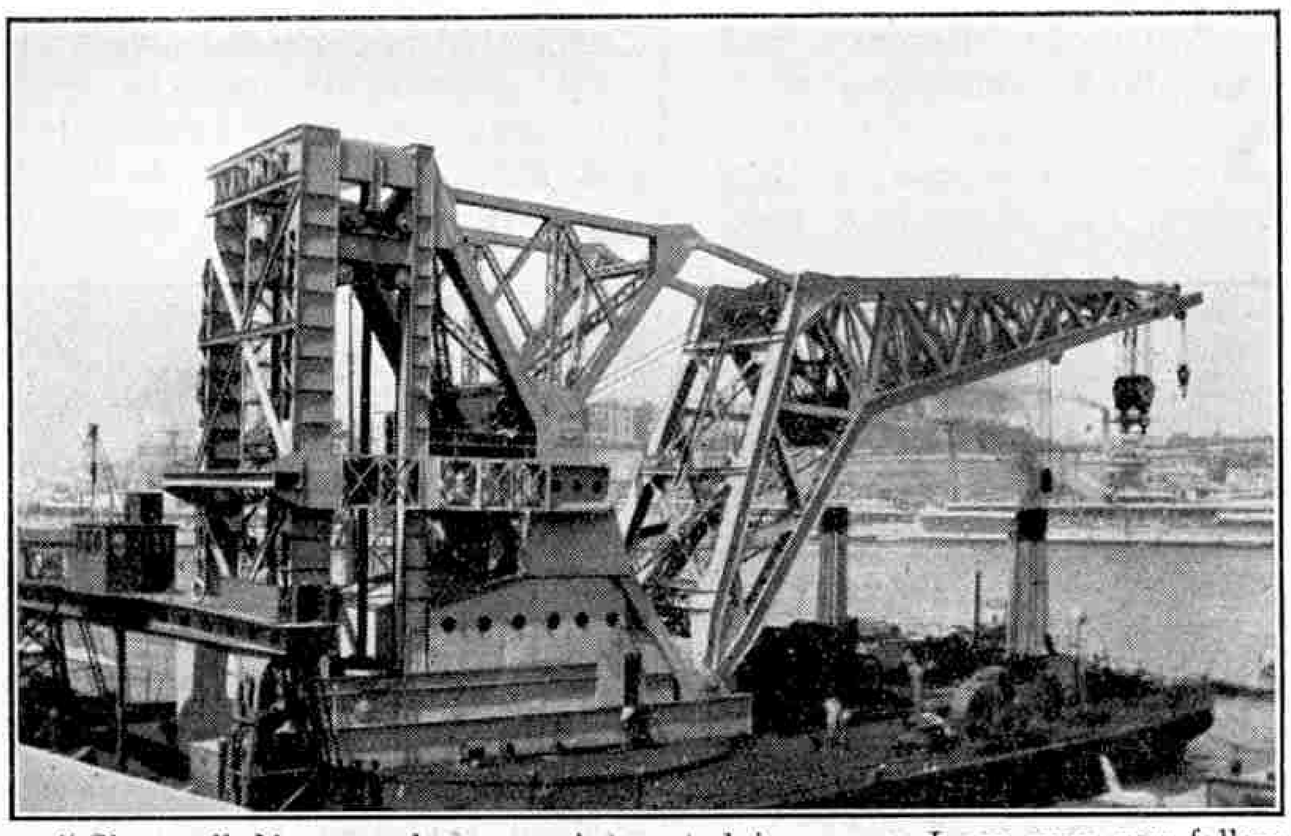
The new service is intended to supplement the Imperial cable services, and the sender of the message may mark it "Via Imperial or Empiradio." The message will then be sent by whichever route shows the least delay at the time of handing in. The charge for transmission per radio beam to Canada is the lowest ever made for trans-Atlantic messages and at 1½d. per word is only 50 per cent. dearer than the ordinary inland telegram. In addition, the speed of the service is remarkable. On the occasion of the opening of the Canadian service a message was sent from London to Montreal and the reply received within 55 seconds!

Senator Marconi is now engaged in further experiments with the beam system and is confident that it can be applied successfully to the transmission of pictures and to television.

* * * *

The power of the lamp in the Lowestoft High Lighthouse has been increased from 240,000 to 440,000 candle power, and the light will now cast a beam visible at from 20 and 30 miles from the shore, according to the state of the weather.

A Monster Crane at Malta



"Since all Meccano boys are interested in cranes I am sure my fellow '*M.M.*' readers will be interested in this photograph," writes Norman Joly of Valetta, Malta.

"This crane, which is now being used for heavy work in the Malta Dockyard, was built in 1916, by Cowans, Sheldon & Co. Ltd., of Carlisle. The lighter on which it stands was constructed by Sir W. G. Armstrong Whitworth & Co. Ltd., in the same year.

"The maximum load on both main pulley blocks is 250 tons—125 tons on either of them. The total load on the auxiliary block or trolley is 30 tons on each, whilst an additional block lifts 5 tons. The crane was first tested in Malta on 9th July 1926, an additional block having been fixed in position in 1924."

Rotor Ship "*Barbara*"

In our August issue in these notes we briefly dealt with the principal details of the new German rotor ship "*Barbara*," the first ship to be built specially to use the rotor system of propulsion. The "*Barbara*" recently returned from her maiden voyage to the Mediterranean Sea and throughout the trip everything possible was done to ensure that the trial should be conclusive.

On the outward voyage the ship met continually with calm areas and consequently had to rely mainly upon her auxiliary engines to make progress. On the homeward trip, however, the conditions were almost ideal. Running on her engines alone, the "*Barbara*" attained a speed of 9 knots, and 10½ knots with engines and rotors working together.

In the course of this run the "*Barbara*" overtook a motor ship and subsequently during a period of calm, was herself overtaken. Later, with the assistance of a strong breeze and the full power of her engines, the rotor ship once more passed the motor vessel.

Structurally she differs very little from the ordinary type of freighter of her size, approximately 3,000 tons deadweight.

Charcoal-Driven Motors

Efficient substitutes for petrol to supply power for motor vehicles have long been sought, and in France charcoal gas has been the subject of considerable research. So promising are the results that the French Government are encouraging the movement by granting a 50 per cent. exemption from taxation to all cars so operated. Several different types of charcoal-driven cars are in use and competitions are being held regularly to afford the manufacturers an opportunity of demonstrating their products in public. The charcoal fuel is being used principally by motor lorries, and in a recent Franco-Belgian contest speeds ranging from 15 to 25 m.p.h. were attained.

The idea of employing charcoal gas for motors sprang from efforts to discover a means of utilising the waste timber produced in the course of forestry operations. France produces nearly nine million tons of such waste each year and from this quantity nearly four million tons of patent charcoal fuel can be produced, with a calorific value nearly twice as great as that of all the petrol used in France in a year. This fact is of immense importance to France since the importation of petrol is one of the big items in the adverse trade balance that helps to keep the value of the franc so low.

The production of charcoal, or charcoal burning as it is termed, is one of the less known industries. The time has passed when the charcoal burner worked alone in the midst of the forest, sallying forth each day to collect his material. To-day complete outfits are moved through the forests to points where working parties have stacked waste timber in piles of approximately 500 tons. Two living vans for workmen accompany each outfit and the complete camp remains at each place for approximately a month.

* * * *

Largest Dry Dock in America

The recently-completed dry dock at Esquimalt, British Columbia, is the largest in America. Some idea of its huge size will be obtained from the following details relating to the materials and work involved in its construction.

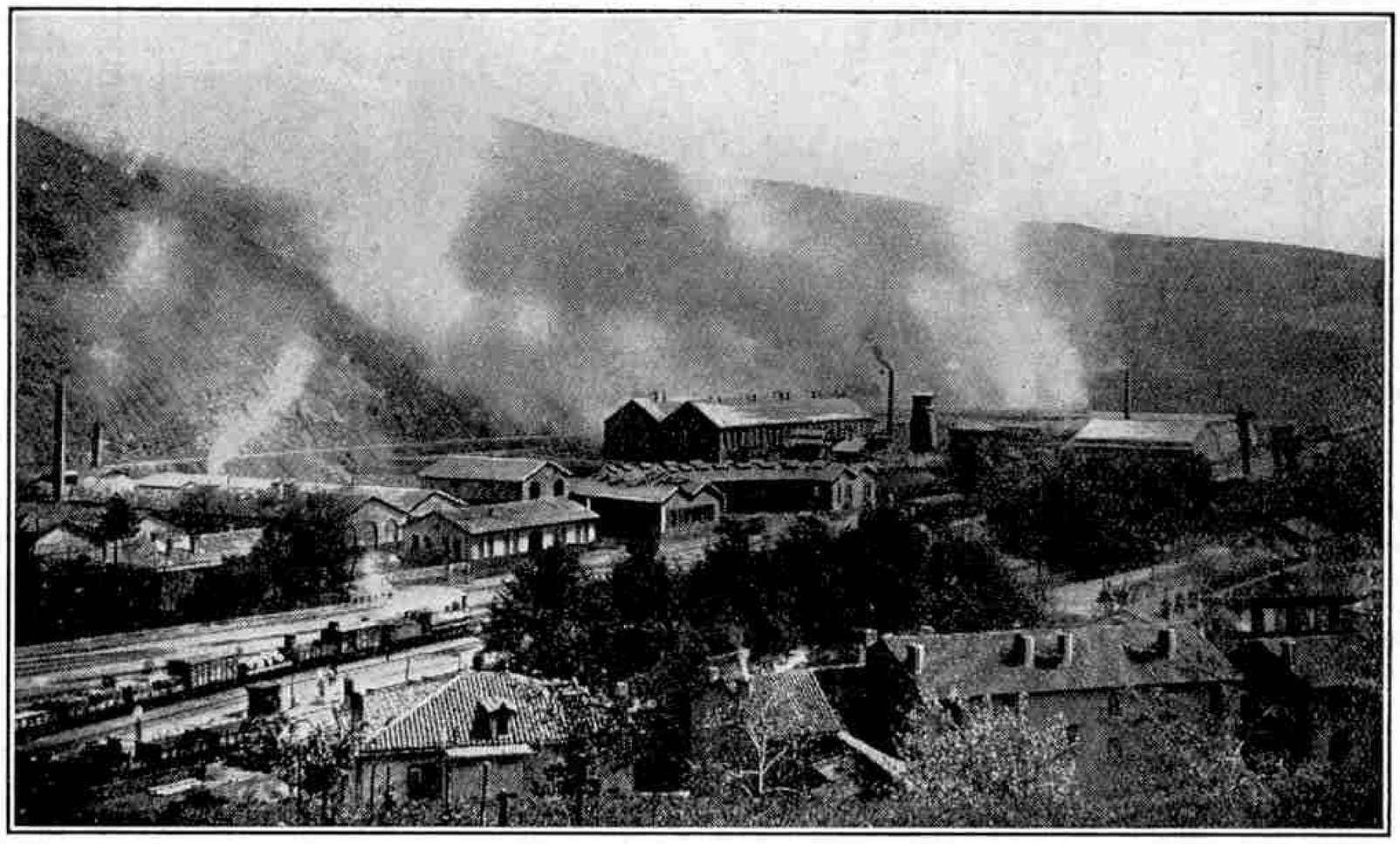
Over 81,000 cubic feet of mud had to be removed from the dock site, in addition to 41,000 cubic yards of earth and 354,000 of rock. The sides of the dock are faced with 105,000 cu. yds. of dressed granite and 103,000 cu. yds. of concrete, and 39,000 lineal feet of coping stone was used. In the reinforcements and caissons, 36,000 lb. of wrought iron, 141,000 lb. of galvanised steel, 1,800 tons of cast iron and 2,500 tons of steel were employed.

The Story of Metals

XIV. ZINC

ZINC is next in importance to lead and copper among non-ferrous base metals, that is those other than the precious metals, such as gold and silver. It resembles copper and lead in possessing a very long history and we do not know when it was first discovered. The ancient Greeks, Romans and Arabians were familiar with alloys containing zinc, but it is not certain whether zinc was known to them in its metallic state. Various passages by early writers appear to refer to metallic zinc, but there is a good deal of doubt as to what really was meant.

So far as is known, the name zinc, or as it was then written "zinck," was first applied to the metal in its metallic form by Paracelsus, the famous Swiss physician and naturalist, who lived from 1490 to 1541. His writings show that he not only realised the metallic nature of zinc but was also familiar with some of its properties.



General View of Zinc Factory at Viviez

It is rather a curious fact that, although zinc remained practically unknown in Europe until late in the sixteenth century, it was known and extracted in various parts of the East at quite an early period. During the 17th and 18th centuries very considerable quantities of zinc were exported from India and China under various names. Among these names was the Dutch word "spiauter," from which probably was derived the present-day term "spelter," which is usually employed for commercial unworked zinc.

Zinc Ores

Zinc is very rarely found in nature in a metallic state, in which respect it differs from gold, silver, copper and many other metals. A large proportion of the zinc used at the present day is derived from a crystalline mineral known as "blende," which is sulphide of zinc and contains about 67 per cent. of the metal, together with over 30 per cent. of sulphur and small quantities of iron, lead, silver and other elements. Deposits of this ore are found in almost all parts of the world.

At the Broken Hill Mines in Australia are found extensive deposits of blende together with galena, iron pyrites, garnets and other minerals, the galena, which is sulphide of lead, being very closely intermixed with the blende. For many years these Broken Hill deposits were worked solely for silver and lead, the zinc being neglected and passed away with the "tailings" to the ever-growing dumps. In 1905 a company was formed to work these dumps on modern methods, and by means of flotation processes, to be described later, enormous quantities of zinc have been extracted.

There is also another sulphide of zinc ore known as "wurtzite."

An important but diminishing source of zinc is smithsonite. At one time this ore, which is carbonate of zinc, supplied the largest quantities of the metal, but the deposits of the ore most suitable for working are to a large extent exhausted.

Early Extraction Processes

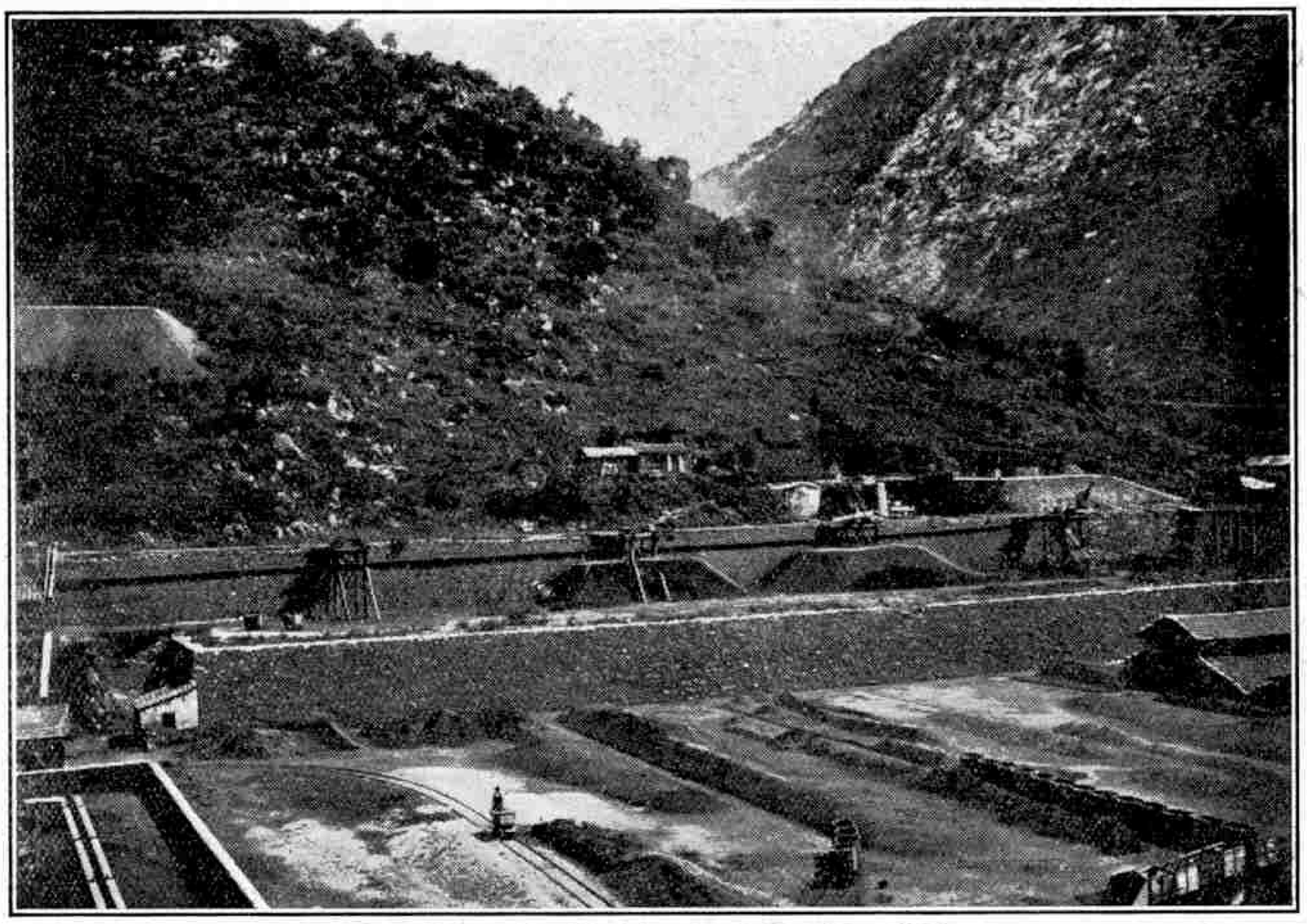
Long before zinc had acquired any importance in Europe the Hindus were extracting the metal by a process of distillation downward into a receptacle containing water. This method apparently was used also in China and it was there that, in the 18th century, an Englishman, Dr. Isaac Lawson, acquired a working knowledge of it. On his return to England Lawson supervised the erection of a smelting furnace for producing spelter by this method, at the brass-making plant of John and William Champion, near Bristol. This Bristol works flourished from 1740 to about 1865, but in its later years it suffered severely from intensive foreign competition and the setting up of a rival smelting works at Swansea by the firm of Vivian & Co.

Towards the close of the 18th century a German named Johann Christian Ruhberg came to England and acquired a knowledge of the methods of smelting then in use. He subsequently returned to Germany and experimented in zinc distillation at Wessola Glass Works near Pless, in Poland. The results did not satisfy him, however, and he set himself to devise a more efficient process. Finally he evolved a method of treatment in large horizontal furnaces called "muffles." A large plant was erected in 1799, near Myslowitz, in Upper Silesia, and Ruhberg's method was successfully

introduced. This works formed the beginning of the great Silesian zinc industry of the present day.

In Belgium, zinc smelting began with many years of patient experiment by the Abbé Don who, in 1806, discovered a distillation process somewhat different from that practised by Champion or Ruhberg. He set up works at Liege in 1806, but although his method was more efficient than its predecessors, the works failed to pay. Don reaped little or no financial benefit from his invention and died in poverty. His process was widely adopted later, however, notably by Germany, and about 1850 it was introduced into England.

In the United States zinc was first produced in 1835 by a man named John Hitz at the Arsenal in Washington, but the first commercial zinc plant in America was not established until some 15 years later.



Zinc Mines in Sardaique at San Benedetto

"Dressing" the Ore

The first stage in the treatment of zinc ore is known as "dressing" and is commenced by passing the elements of ore over large iron screens inclined at an angle of 30 degrees. The smaller pieces fall through the mesh into a receiving bin underneath and are known as "undersize." The material that fails to take the screen is known as "oversize" and is passed on to rock-breakers, by which it is reduced to the necessary smallness. The rock-breakers usually consist of a steel casting containing two powerful jaws lined with lead and covered with detachable facings of manganese steel. These jaws are inclined towards one another, one being firmly fixed while the other moves pendulum fashion upon a pivot as the ore passes between the two. After this crushing the ore is led to the receiving bin containing the smalls from the first screen.

From the bin the ore is passed on to an endless belt in order to be sorted. This belt is of indiarubber and is usually about 2 ft. in width. Boys are stationed at intervals along both sides of it and as it moves along with its load of ore they pick out all useless or undesirable material that can be detected. The ore now undergoes further disintegration by being passed between slowly revolving iron crushing rollers. The crushed material is then passed to a rotating conical screen called a "trommel," which has a very coarse mesh.

All ore that falls through the trommel passes down a chute leading to a "Jig," which is a wet stamping plant comprising two, three or four compartments arranged in the manner of steps and each fitted with a sieve of finer mesh than the one preceding it. From the chute the ore enters the top sieve or cell of the jig and is violently agitated by hydraulic action, which causes the lighter particles to be washed over the compartment edge and carried down to the finer sieve next below. The agitation is repeated in each section as floating particles are received.

The oversize from the trommel is conveyed by chute to the topmost sieve of a second jig and similarly treated. Each sieve retains "heavy" particles which sink to the floor of the compartment and are later drawn off through a discharge pipe regulated by a valve.

A "Shaking" Table

Some of the undersize from the tapered end of the trommel is too fine for treatment in a jig in the ordinary manner and is passed through a "classifier." This apparatus consists of a series of compartments through which flows a current of water gradually diminishing in speed and its effect is very similar to, though less pronounced than, that of the jig. The lighter particles are carried on by the water and the remaining deposit of heavier particles is transferred to what is known as a "Wilfley" table.

The Wilfley table may be described as a shaking table. The table top rests upon rollers moving in a grooved iron bed and an arrangement of "toggle" levers enables a quick jerking motion to be imparted to the table, which is given on average 240 shakes per minute. The table slopes to one side, the amount of the slope being adjustable. The top is traversed by a series of parallel wooden strips or "riffles," the top strip extending half the length of the table and subsequent strips being each slightly longer than the previous one.

The ore enters a compartment overlooking the inclined table from the raised side and passes down by the aid of jets of water, each emitted at a different angle from adjoining compartments. Heavy particles are caught by the top riffles while the lighter particles are arrested after being carried a short way by the water. The mechanical agitation shakes the arrested particles from the riffles and subjects them to renewed separation by the water, and in this manner the pulp is thoroughly broken up and the light valueless matter swept away as "tailings." The deposits of blende and galena are later collected from the riffles preparatory to calcination.

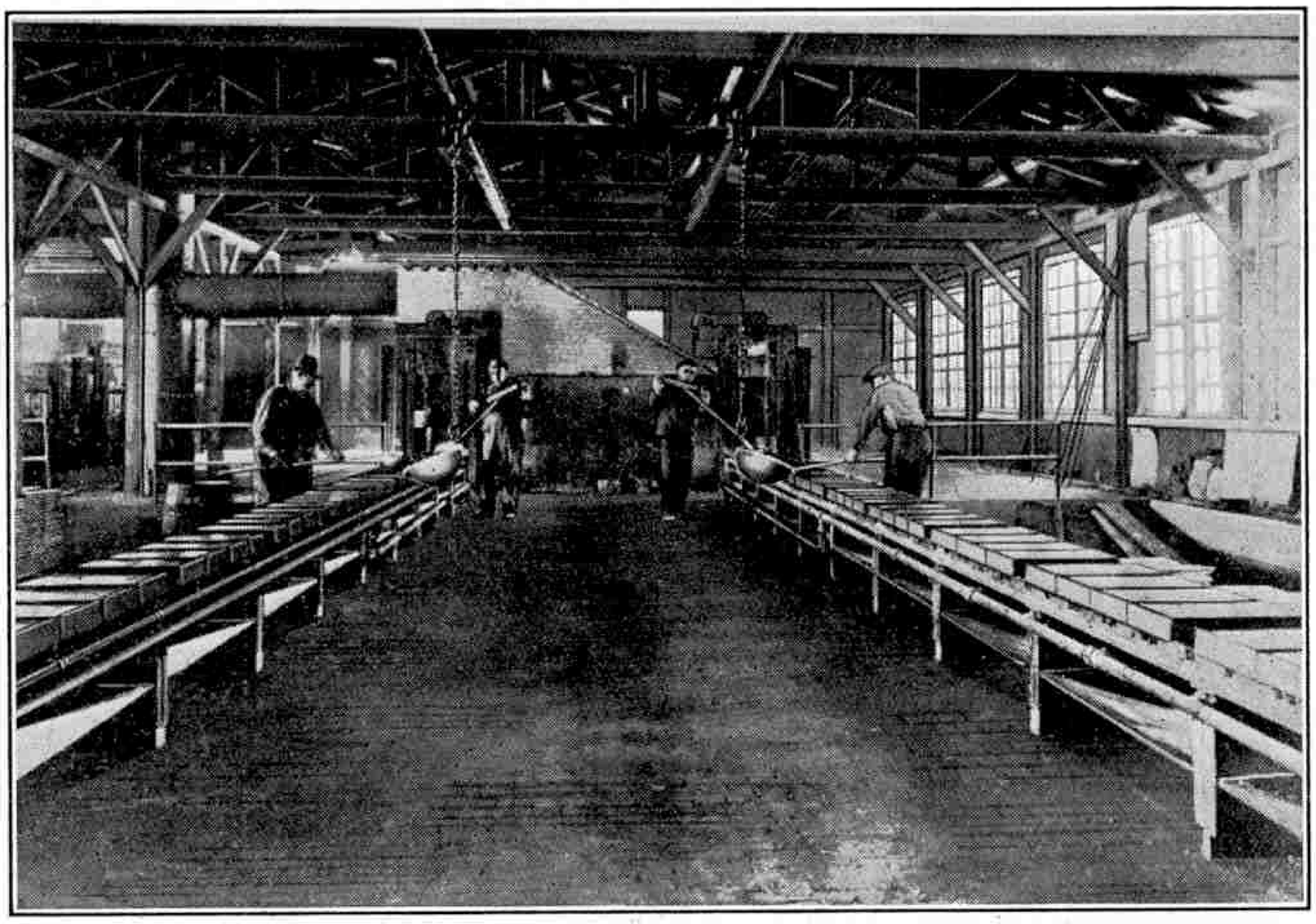
The dressing of zinc ore is carried out also by various froth flotation processes, the general principle of which

is to agitate the crushed ore with a quantity of oil. The intense aeration set up causes the mineral particles to adhere to oil globules rising to the surface, thus forming a thick froth or scum, which is either skimmed off or flows into a channel bordering the flotation tank.

There are also methods of dressing zinc ores by means of magnetic separation.

Calcining and Roasting the Ore

After "dressing" by one of the methods already described the zinc ore is usually calcined and roasted to prepare it for smelting. Calcining may be described as a process of heating by which certain chemical constituents are eliminated from the ore; and roasting, also a heating process, causes certain chemical constituents to combine with the ore. The two processes of calcining and roasting are carried out in various types of furnace, most of which operate on a combined principle of heating and raking by mechanical means. The "Hegeler" roasting furnace, for instance, consists of hearths built in two 7-row tiers separated by a thick wall. The ore is fed to the topmost hearth or "muffle" of each set and mechanically raked along that and each succeeding lower muffle in turn. The four upper muffles of each set are heated by hot air led upward from the bottom hearth. The remaining muffles comprise the roasting hearths and are heated by producer gas, the flames from which are allowed to travel beneath and above each of these lower hearths.



Electrolytic Zinc Plant, Anaconda, U.S.A.

Smelting

It now remains to smelt the calcined and roasted ore. The process consists of heating the ore with a suitable reducing agent, generally anthracite, so as to produce zinc vapour, which is then condensed. The majority of zinc smelting furnaces in use to-day consist essentially of a series of small retorts or muffles arranged more or less horizontally, with suitable condensing arrangements attached above the retorts. The different types of furnaces differ in various details and the time occupied in the process varies considerably. The smelting process is intermittent in that it is interrupted at intervals for discharging the retorts and preparing for and introducing fresh charges. Continuous smelting processes utilising blast furnaces have been tried but up to the present have not been commercially successful. Much better results have been obtained by electric smelting in arc or resistance furnaces.

Electrolytic processes for the extraction and refining of zinc have come into existence during the last half century. The famous Anaconda Copper Company, for instance, have in operation a huge plant for the electrolytic treatment of the zinc ores raised in their mines in Montana, U.S.A. This plant is capable of an annual output of over 35,000 tons of zinc.

Properties of Zinc

Pure zinc is a white metal having a slight bluish tinge. It is harder than aluminium but softer than silver, and is malleable and can be hammered or rolled into thin sheets. Commercial zinc or "spelter" is brittle at ordinary temperatures, but if heated to a temperature of between 110° and 150°C it becomes malleable. An even more interesting change takes place at a temperature of approximately 400°C, for the spelter once more becomes brittle! At a temperature of about 420°C zinc melts and can be run into moulds for castings.

Zinc is very highly resistant to the action of the atmosphere. Dry air indeed has practically no effect upon it at all, but moist air containing carbonate acid gas converts the surface of the metal into a carbonate of zinc, which forms a protective coating and stops any further change. This property of zinc is of great value for many industrial purposes such as the construction of roofs. Very large quantities of spelter—probably about half of the total consumption—are used for coating or "galvanizing" iron to prevent it from rusting, the iron after thorough cleaning being immersed in a bath of the molten zinc. The metal is also used to a large extent for lining boxes and drawers and various articles in ordinary domestic use.

In the electrical industry zinc plays a very important part in the form of rods or plates for various forms of primary batteries and also in the plates of accumulators.

The alloys of zinc have played a very important part in history, notably brass, the alloy of zinc and copper. The earliest references to brass are rather ambiguous, but there is some reason for thinking that the alloy was made and used as far back as 300 years B.C. There are several different alloys included under the term "brass," but these form only a few of the known zinc alloys, the total number of which is between 500 and 600.

A Trip on a Trawler

How Fish is Caught on a 10-day Trip

By L. J. L. Lean, M.A.

IT was a fine, sunny afternoon as our steam trawler nosed through the lock gates at Milford and began to steam down the wonderful Haven. Passing the picturesque old forts—relics of days when mighty three-deckers sailed up to Pembroke or lay at anchor in Dale Roads—and the ugly humps, which are the modern batteries, we reached St. Ann's Lighthouse, and from thence sailed on into the open sea, where our boat began to pitch in a swell from the south-west.

To starboard the rocky islands of Skomas and Skokam reared their rugged masses, with the westering sun bringing out the curious colourings of the steep cliffs. Soon we had passed the dangerous Barrels and the Hat Rocks, and were steaming towards the setting sun, with the Smalls Light but a dot on our starboard quarter.

Next morning we were off Ireland, with its wonderful coast and cloud-capped mountains. From Cape Clear and the Fastnet Light to the Bull; from the Bull to the Skellegs; from the Skellegs to Blasquet Light, on the north side of Dingle Bay, we steamed, and ever the coast scenery seemed to be more rugged and wild. Once again, as night fell, we were alone on the sea, but somehow a different and more sullen sea.

At dawn, when we were some fifty miles west of Galway coast in about 200 fathoms of water, there was a rattling of winches and the tramp of heavy sea boots on deck. The crew were passing overboard the great 160 ft. long and 140 ft. wide trawl, which could be seen sinking slowly to leeward as the water soaked into the dry netting. Then the foot and head ropes, the latter with its row of glass globes —"bubbles" they are called and of glass because that alone will stand the great pressure of two to three hundred fathoms of water—were passed overboard, the bridle ropes paid out a little, and the trawl veered astern. The trawl-boards were now attached between bridles and warps and dropped overboard, while the ship went slowly ahead. Some five to six hundred fathoms of steel-wire warp vanished over the side before the trawl was riding smoothly on the bottom, the fore and aft warps brought together in a shackle on the quarter, and all made fast for some six hours' towing over the fishing ground.



Courtesy] **The Fish at Milford Haven Ready for Sale** [*G.W.R. Co.*

The engines stop and the winches clatter until the trawl boards appear at the gallows, to which they are hooked. They are "cut out," and warp and bridle are again run in until the 140 ft. wide net appears alongside, and the head is drawn aboard with the quarter ropes. Then comes some hard work—the hauling of the net aboard until the "cod" end with the catch in it is close under the side, when a "becket" is passed round its neck and the cod end hauled forward and upward until it is suspended over the "pound" on the fore deck. The end of the bag is unfastened, and the fish cascades into the "pound" in a glittering wriggling mass.

The cod end is then fastened up again, thrown overboard, and the trawl "shot" once more. As soon as this has been done the deck hands start gutting, sorting and washing the catch, which is then stowed in appropriate holds between layers of ice.

The routine of shooting, hauling, and gutting goes on during calm and storm alike, the men sometimes in their shirt-sleeves, sometimes in oilskins and sea boots, broken only by the call of the cook, and a few hours in the bunk. Fortunately for the crew, the fish rise from the bottom at night and escape the sweep of the trawl. Fishing is thus suspended from sunset to dawn, but if fishing is good, this means some 14 hours' continuous hard work in winter and 20 in summer, outside other claims on the crew occasioned by bad weather or mishaps to the gear.

At the end of a week or ten days the holds begin to look full, and thoughts turn to the delights of land. At last the skipper decides that he has made a good "trip," and the net is hauled aboard for the last time. Then the nose of the boat is pointed towards the south-west corner of Ireland.

Once again Blasquet Island looms in the distance, and the mighty Skellegs, with their ancient monastic legends, rise up ahead. Soon the mouths of Dingle and Bantry Bays have been crossed, the Bull is rounded, and Cape Clear and the Fastnet Light take shape in the east. In the morning we can see the Welsh coast dimly ahead, and soon are running into the calm of the Haven.

By next morning the fish has been unloaded, washed clear of ice, and neatly packed in "kits," ready for sale. Auctioned, boxed and iced, that afternoon the "traffic" is off on its long rail journey. Late the same night or early the next morning the fishmonger collects it from the railway station, and at midday you eat it.

A word as to the position of Milford Haven as a fishing port. Last year 749,355 cwt. of deep-sea fish, and over 124,160 cwt. of herrings were unloaded. Some of these were sold and distributed fresh, others were cured on the spot and distributed as kippers, while very considerable quantities were sent to the East Coast curing factories. Even the East Coast fishermen admit that the Milford herring is the finest of all, surpassing even those from Loch Fyne, which for a long time held pride of place.

* *Reprinted, by special permission, from the G.W.R. Magazine*

Is Seeing Believing?

Optical Illusions in War and Peace

THE old saying that "Seeing is believing" received a severe shaking during the later stages of the war, and many commanders of German submarines were thoroughly convinced by practical demonstration that it was not true!

At one period of the war, when the German submarine campaign was at its height, the shipping problem became a very serious one for the Allies. All available Naval resources, offensive and defensive, were brought into play to protect our ships and, in addition, experts of all kinds were consulted with a view to discovering some means of making a ship a less easy target.

Considerable success had been achieved on land in the way of concealing vulnerable points by painting them so as to resemble closely their immediate surroundings. Nothing could be more conspicuous to aircraft, for instance, than a large encampment with its white canvas tents arranged in long and regular lines. If, however, the tents are painted green to match the surrounding fields or trees and deliberately dis-arranged so that there are no straight lines, the visibility of the encampment is reduced to an enormous extent.

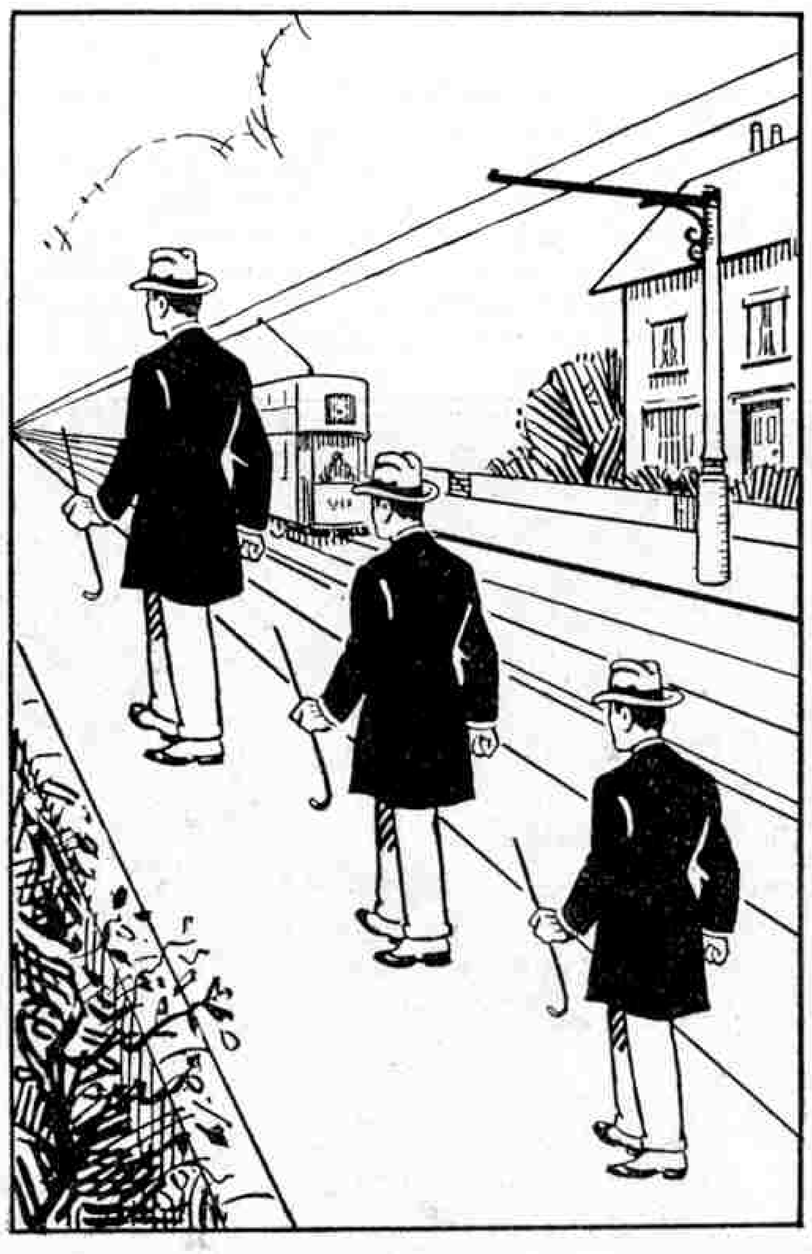


Fig. 1

At first sight it might be thought possible to adopt similar methods at sea, but this is not the case. On land the surroundings of almost all objects change very little in colour, and those changes that do occur occupy considerable periods of time for their completion. On the other hand the sea, which forms the surroundings of a ship, is continually and rapidly changing in appearance. The result is that, if a ship is painted green with the idea of making it invisible against a green sea, it is immediately deprived of all concealment when the sea becomes grey or deep blue in colour. In addition a further and greater difficulty lies in the fact that, no matter how a vessel may be painted, if an observer can get it between himself and the sun its outlines stand out in strong relief, making any attempt at concealment out of the question.

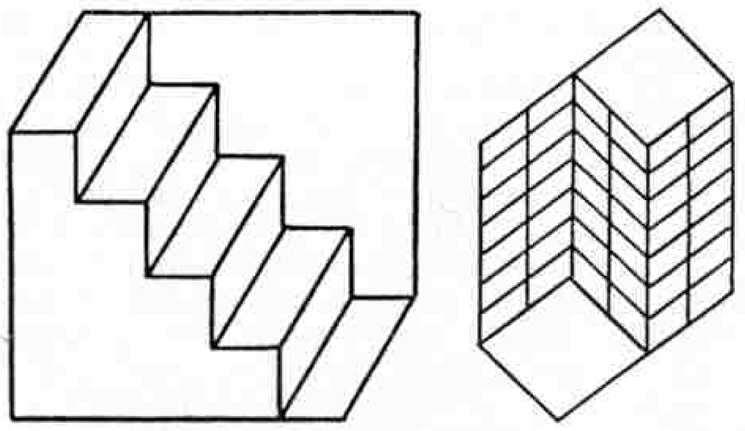


Fig. 2

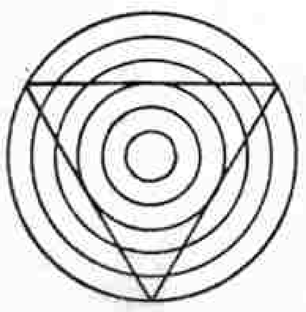


Fig. 3

Concealment thus being impossible, the experts who were tackling this problem decided to go to the opposite extreme and make the ships as visible as possible, at the same time altering their appearance by breaking up their normal lines. By the use of vivid colours laid on in all kinds of weirdly shaped bands, curves and spots, the true perspective of a ship was altered to such an extent that it was extremely difficult for an observer to grasp the real shape of the ship or to form an accurate estimate of its speed and course.

By means of this "dazzle painting" most extraordinary illusions were created. Long vessels were made to look short and fat while short tubby vessels appeared long and slender. It was comparatively easy to disguise the bows and stern so that they appeared to have changed places, with the result that at a distance it was extremely difficult to tell in which direction a ship was travelling. It was even possible to make a large ship appear to be two smaller ones, one towing the other!

This camouflage was certainly not to the liking of the German submarines. When an Allied vessel was sighted, the usual submarine plan of attack was to remain on the surface at a considerable distance for such a period as was necessary to estimate the size, speed and course of the ship. From these observations it was easy to calculate with considerable accuracy where the ship would be at the expiration of 10, 15 or 20 minutes. The submarine then submerged and headed in the required direction, breaking surface again at a suitable point for launching a torpedo. The effect of our camouflage was to upset the calculations of the submarine commanders to such an extent that they frequently came to the surface too close to their intended victims and were run down or otherwise sent to the bottom before they could bring their torpedoes into action.

The wartime camouflage of our ships afforded a striking example of the ease with which our eyes can be deceived. At the same time it is not easy for those who never saw a

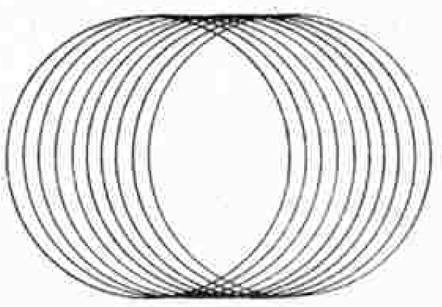


Fig. 4

camouflaged ship at sea to realise how the astonishing effects were brought about, and the following examples of "eye deception" may help to make the matter clearer.

One of the simplest deceptions is brought about by the use of diagonal lines. In Fig. 9 the two vertical lines appear to converge from bottom to top, but as a matter of fact they are parallel. The illusion is produced by the diagonal lines, which upset our sense of direction. A similar effect is shown in Fig. 11, where the rectangle is made to appear to narrow from bottom to top, whereas it is really quite symmetrical. The interest of these two figures will be increased if they are turned upside down and the effect noted.



Fig. 9

In Fig. 6 we have a rectangle which appears to bulge out at the centre, although its sides are really parallel; and in Fig. 7 our eyes are led to believe that the two horizontal lines come closer together in the centre.

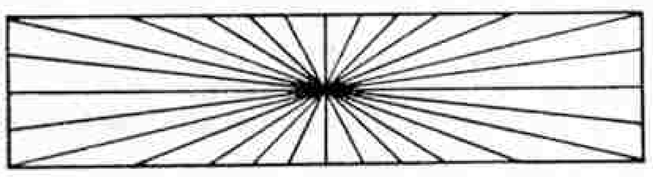


Fig. 6

Another remarkably simple illusion is shown in Fig. 12. The lower horizontal line looks to be longer than the upper one, but if you measure them you will find that they are the same length. Here again the illusion is caused by oblique lines. In the first case these lines tend to lead the eye outward at each end of the horizontal line, thus creating the illusion that the latter is longer than it really is. In the other case exactly the opposite illusion is produced.

Fig. 8 is an interesting illusion. The top line of the upper figure looks longer than the top line of the lower figure, but both are equal. Fig. 3 and Fig. 10 are striking examples of eye-deception of another kind. In Fig. 3 the sides of the triangle, which are straight, appear to be bent inward, and in Fig. 10 a normal circle appears to be flattened at one side and to bulge out at the other.

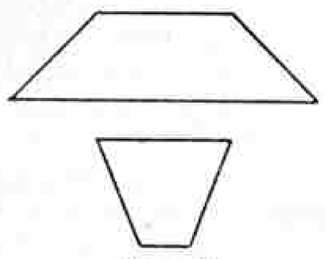


Fig. 8

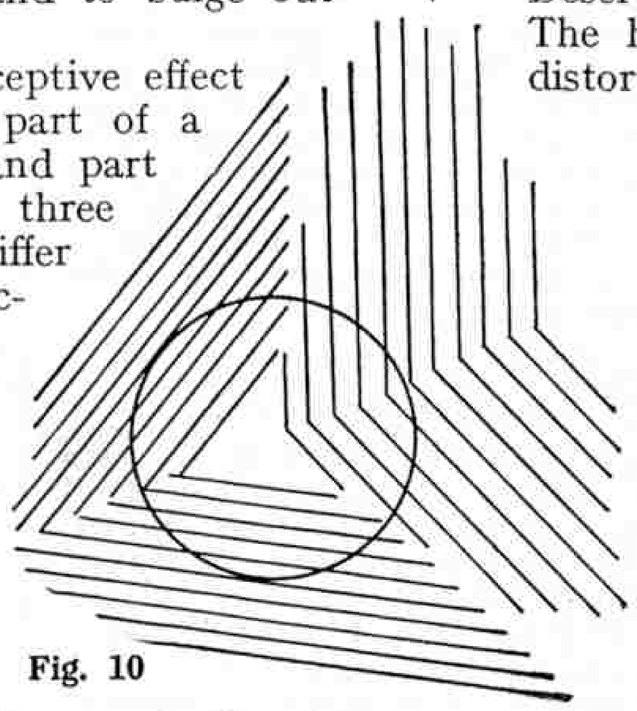


Fig. 10

Fig. 1 shows the deceptive effect produced by drawing part of a sketch in perspective and part not. In this case the three figures appear to differ greatly in size, but actually they are all exactly the same, and it is this fact that produces the illusion. Each of these equal-sized figures is placed at a certain point of the picture without any reference to the general perspective, and therefore the eye is deprived of any means of estimating their actual size.

Illusions of an even more interesting type are those shown in Fig. 2 and Fig. 4. The perspective of the two sketches in Fig. 2 is so indefinite that the formation appears to change as we look at it. The left-hand figure, for instance, may at first appear to be a top view of a flight of steps and then, as we watch it, the whole thing appears to turn over and we see an underneath view of steps! In the right-hand figure the effect is even more extraordinary and it is practically impossible to look at it for more than a second or two without its whole appearance suddenly changing. In this case seeing is most certainly not believing!

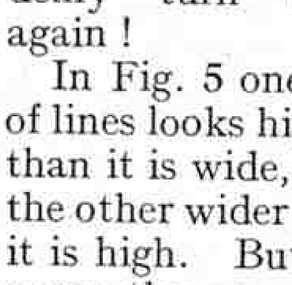


Fig. 5

Fig. 4 is apparently a normal drawing, but as we watch it it suddenly turns itself over. Whereas we thought we were looking through a sort of tube from left to right, we suddenly find that we are looking through one from right to left, and *vice versa*.

The curious thing about illusions of the type just mentioned is that we cannot do anything to prevent them. In spite of all our efforts to the contrary, if we look at the figures steadily they suddenly turn themselves over and just as suddenly turn back again!

In Fig. 5 one set of lines looks higher than it is wide, and the other wider than it is high. But both are square, and in spite of appearances they are exactly equal.

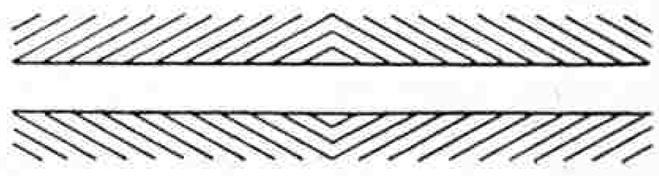


Fig. 7

In the examples we have already described, the illusion lies in the nature of the thing looked at, but there is also another kind of illusion that is due to the "wobbling" of light rays on the way from the object. For instance, we are all familiar with the quivering, waving effect produced above a source of heat, such as a gas jet or a night watchman's glowing coke fire. This effect is due to distortion of the light rays by the heated air, and any object looked at over the gas jet or fire appears to be quivering also, although we know it is really still.

The wonderful mirages seen by travellers in the Sahara Desert are produced in a similar manner. The hot air rising from the sand may distort the light rays to such an extent as to make the trees of a far-away oasis appear many miles nearer than they actually are, to the subsequent disappointment of the weary and thirsty traveller! On other occasions a portion of the ground some distance ahead may disappear from sight and in its stead there will apparently be a lake out of which tall objects, such as trees, appear to rise, while their apparent reflections are seen in the waters of the imaginary lake.

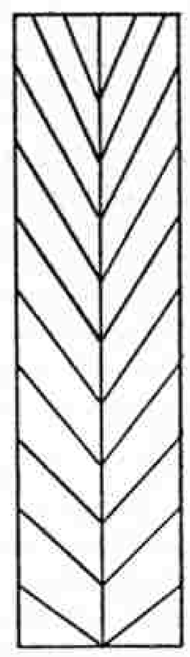


Fig. 11

Although mirages are usually associated with hot countries, it is an interesting fact that they occur in both the Arctic and Antarctic regions. Here the heat of the sun brings about rapid evaporation from the surface of the sea, and it is the cooling of this moist air by passing over considerable surfaces of ice that causes the light rays to "wobble" and thus produce the mirage.

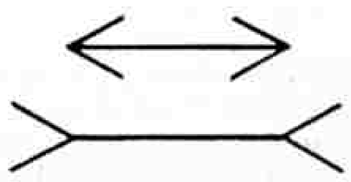
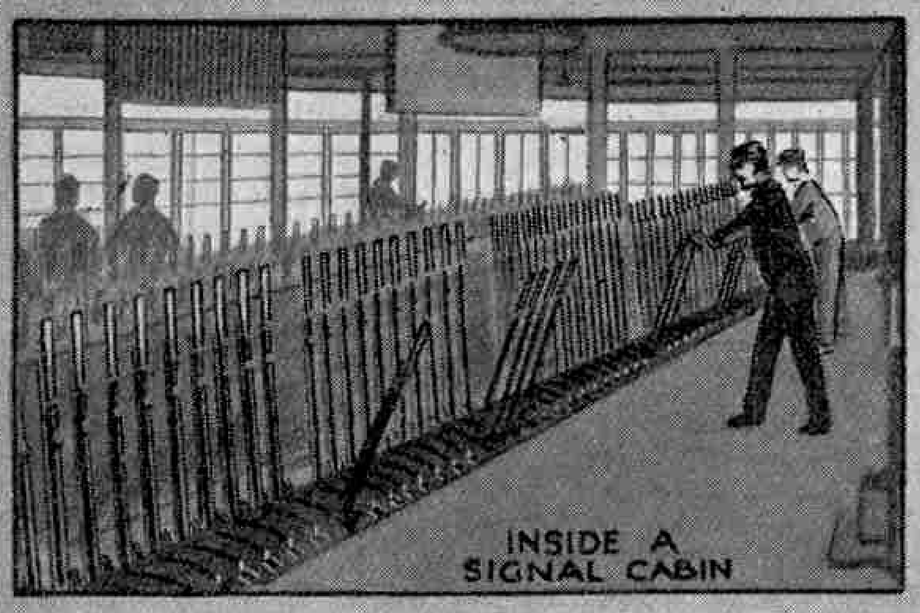


Fig. 12



Railway News of the Month

Railway Nicknames

Shortly after the grouping system was introduced on the railways, many people were greatly concerned in endeavouring to find conveniently shortened names for the various lines. But the efforts were by no means in the nature of a new game for as such it can be dated back as far as 1863.

When the Metropolitan Railway was opened in that year the new line was commonly known to Londoners as "The Drain." The Lancashire and Yorkshire line was popularly known as "Lanky" but the self-appointed christeners were even more cutting in the case of a certain famous railway—it shall remain incognito—that was dubbed "Beef and Cabbage" owing to the sameness of its dining-car meals.

Another family name given to a railway was that applied to the old Manchester, Sheffield, and Lincoln line in days when it was doing none too well. Its "M.S. and L." was converted by disappointed shareholders into "Money; Sunk and Lost."

* * * *

An Albanian Railway

Albania possesses the unenviable distinction of being the only European country without a railway but before long this deficiency will have been remedied, for a line connecting Tirana and Durazzo is now nearing completion.

The length of the line is only 23 miles but probably the construction costs per mile will be lower than on any other European line. The reason is easily discovered. The laws of Albania compel every able-bodied man, under the age of fifty, to work without pay on State works for six days each year and the new railway has had the full benefit of those laws.

* * * *

New Light Railway

Powers have recently been granted by the Ministry of Transport for the conversion of the South Shields, Marsden, and Whitburn Colliery Railway into a light railway. This is one of the old wagon ways that are found here and there in Durham and Northumberland.

* * * *

After an existence of only 13 years the Derwent Valley light railway was closed at the commencement of September, owing to the absence of payable traffic. The railway was 16 miles in length and afforded a useful link between the important agricultural area in the Derwent Valley and the markets at York and Selby.

Express Breaks in Two

It is very rare that the automatic brakes fitted to trains have an opportunity of functioning under the conditions for which their automatic action was specifically designed, but such an occasion arose recently when an express train travelling from London to Ilfracombe broke in two pieces when travelling at 60 m.p.h.

Difficulties Explained

II. White Diamonds on Signal Posts

Several readers recently have inquired the meaning of the white enamelled, diamond-shaped plates that often are seen fixed to signals.

These plates are fixed to the starting and advanced starting signals at points where the line is track-circuited or protected by other means, such as the "lock and block" system. They serve as an indication that it is not necessary for the famous "Rule 55" to be observed. Under Rule 55, in the absence of the diamond, it would be necessary for the fireman to proceed to the signal box to remind the signalman of the engine's presence at his signal.

The vacuum brakes, however, came immediately into play and brought both portions of the train to a standstill. No-one was injured, neither was there any damage, and after a delay of 19 minutes while a new coupling was fitted, the train was able to proceed. Many passengers were entirely unaware of the cause of the stoppage.

* * * *

Railway Photographs on Cigarette Cards

A very interesting series of cigarette pictures entitled "Railway Wonders" is being distributed by Messrs. W. A. and A. C. Churchman in their packets of "Churchman" cigarettes. The set consists of 25 cards, each of which comprises an excellent illustration of some piece of railway mechanism or apparatus together with a brief but accurate description of its operation and purpose. The cards are well printed and are of interest to all railway enthusiasts.

* * * *

The L.M.S. are effecting several important improvements at their Ayr Docks and the gates to the existing wet dock are being removed to enable the entrance to be deepened by another three feet.

No Passengers on Engines !

The following old railway order published in 1849 is of historical interest :—

"The goods train from North Berwick has just arrived with two passengers on the engine, neither of whom have any right to be there. McCullock, the engine driver, must pay first class fare, four shillings for each of them. And as I know that several persons are allowed to travel on the engine upon the North Berwick Branch who have no right to do so, I now warn him that the next offence he commits in that way will cause his dismissal from the Company's service. Such proceedings are neither more nor less than frauds on the Company and must be put a stop to instantly."

December 12, 1849.

Signed, CHAS. F. DAVIDSON.

* * * *

Excursions—Then and Now

Now that the 1926 railway excursion season has passed it is of interest to compare modern conditions with those prevailing in earlier days. One often hears complaints of the slowness and discomfort of excursion trains to-day, but imagine the conditions in one early train, one of the first excursions ever run to Brighton from London. It started as a train of 45 coaches drawn by four locos, and passengers were to be picked up en route. When it eventually reached its destination the train consisted of 57 coaches and six locos !

* * * *

A Man Whom the King Obeyed

A driver, who more than twenty-two years ago made a railway speed record that has never been equalled or beaten, recently retired after forty-eight years' railway service. He is Mr. G. H. Flewellen, of Swindon. "I am the only man in England," he says jokingly, "who has made the King do what he was told ! It happened when the King visited Swindon in 1924 to inspect the Great Western Railway works. On that occasion the King drove a train for a mile and a quarter under my supervision. As he knew nothing about driving a railway engine he had to do everything as I told him to do it !"

* * * *

To enable the class of train hauled by a locomotive to be more readily noted from its headlamps, the L.N.E.R. have decided that all their loco headlamps, some 21,600 in number shall be painted white.

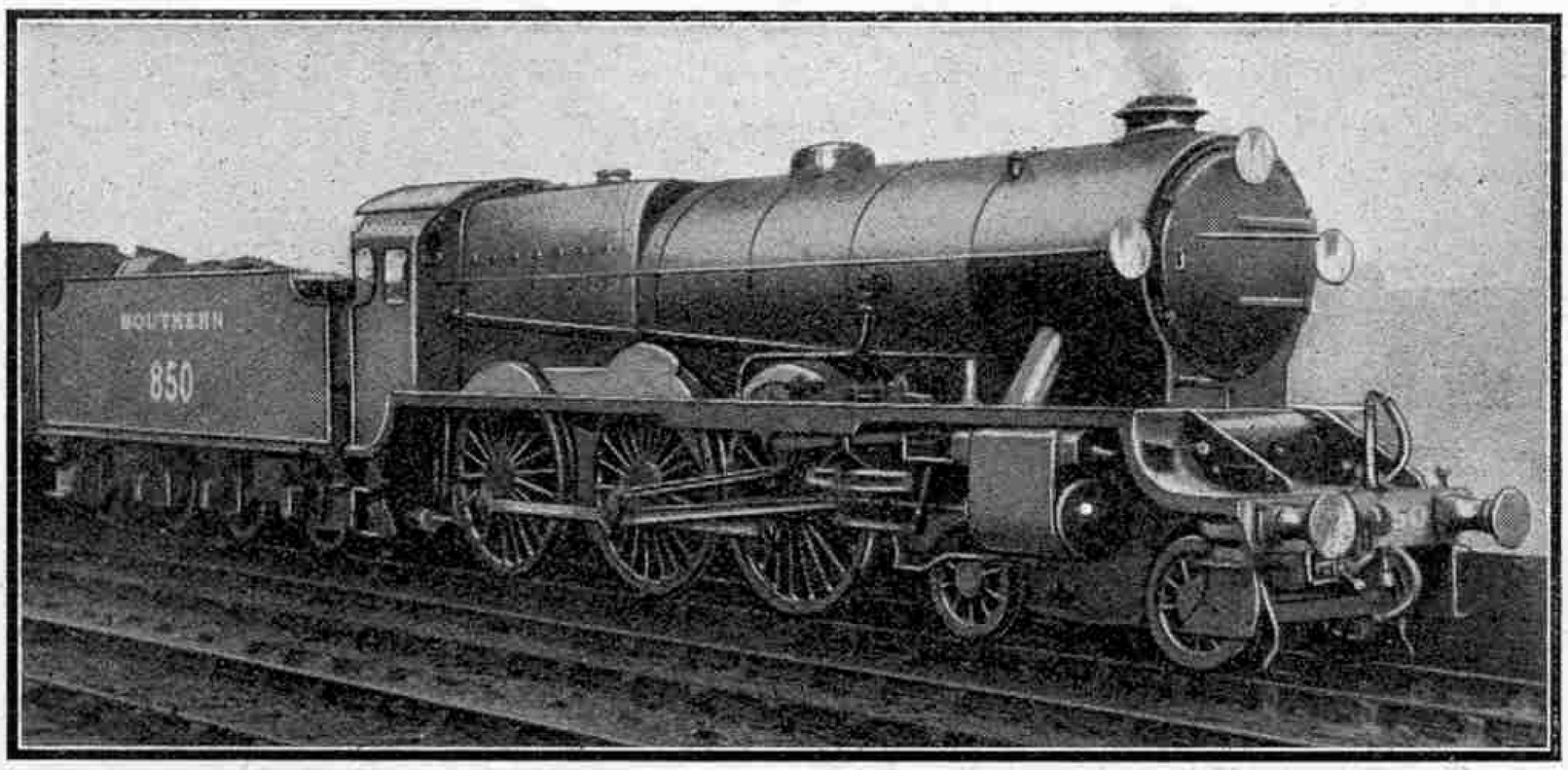
New Loco for Southern Railway

By T. Alexander (Eastleigh)

There has been completed recently at the Southern Railway workshops at Eastleigh a new locomotive which, it is confidently expected, will prove more powerful than any yet built for this railway. The new loco has been named "*Lord Nelson*" and numbered 850. It is a four-cylinder superheater loco of the 4–6–0 type and weighs about 80 tons, this being approximately the limit for the track.

The new giant is 3 ft. longer than the "King Arthur" locos, many of the desirable features of which are incorporated in it. Two new features for Eastleigh construction are the square firebox and the side windows in the driver's cab. The tender is of the well-known Ashford type carried on two four-wheel bogies.

The construction of the "*Lord Nelson*" was held up by the general strike and in consequence a good deal of overtime had to be worked in order to complete her according to schedule. As it was, she took her trials in her first coat of grey paint. For several days while working the Waterloo to Bournemouth expresses she was an object of great interest to railway men and passengers alike, her drab grey contrasting strangely with the usual green livery of the Southern locos. She has now received her final green coat and her handsome appearance has won for her many admirers.



The new 4-6-0 four-cylinder Southern Loco (No. 850) "Lord Nelson," photographed by T. Alexander, a "M.M." reader

* * * *

Egyptian Gauge Conversion

Approximately 143 miles of narrow-gauge track have now been converted to broad gauge on the Luxor-Shellal section of the Egyptian State Railways, and the length of time occupied in travelling from Cairo to Khartum will be considerably decreased by the change. Hitherto it has been necessary to break the journey at Luxor.

* * * *

New L.M.S. Locos

One hundred 2–6–0 mixed traffic locos are at present being built for the L.M.S. They will have outside cylinders 21 in. by 26 in. and driving wheels 5 ft. 6 in. in diameter. The weight of the locos alone will be 66 tons, and with the tender 108 tons 4 cwt. Seventy of the locos are being built at Crewe and the remainder at Horwich.

* * * *

A new L.N.E.R. station has been opened at Welwyn Garden City, Hertfordshire.

Australian Cricketers' Fastest Run

The last railway trip of their English tour will probably have left a lasting impression of speed in the minds of the Australian Cricket touring party. Leaving London at 9.5 a.m., 1st October, by special G.W.R. train from Paddington en route for Birkenhead prior to crossing to Liverpool to embark on the C.P.R. liner *Montrose* which was to take them to Canada and the United States, their "special" reached Birkenhead after a 210 miles run, at 1 p.m. exactly. Thus the time for the complete journey, including stops, was 3 hrs. 55 mins., a record for the run. The average speed throughout, excluding stops, was 54.6 m.p.h.

The train weighed 250 tons, excluding the engine, and for the first portion of the journey, from Paddington to Shrewsbury, was hauled by loco No. 4082, Windsor Castle. The average speed for the 123 miles to Wolverhampton was 60 m.p.h. and the highest speed 92 m.p.h.

For the remainder of the journey, from Shrewsbury to Birkenhead, the train was hauled by loco No. 3811, County of Bucks, which did the run from Wrexham into Chester, 12 miles, in 12 minutes.

* * * *

Closing Down

The competition with motor omnibuses having proved too much for the Burton Ashby light railway, operated by the L.M.S., it has been decided to apply to the Ministry of Transport for authority to close the line.

* * * *

Electrification and Increased Revenue

It is estimated that, as a direct result of the additional facilities provided by the electrification of the railways in the Melbourne area, an annual additional revenue of £325,000 has resulted. Since 1918 the number of suburban passengers has risen from 97 million to 158 million per annum. The railways are operated by the State Government of Victoria. The cost of the electrification has been about 6½ million pounds.

Swedish Railway Electrification

The recent electrification of the section of the Swedish State Railways between Stockholm and Gothenburg is probably only the first step toward the extension of electrical operation throughout the entire system, for an almost unlimited supply of current is available from the State's own hydro-electric plants.

At present the electric locos are maintaining the old steam loco running schedule, but next year it is anticipated that the time for the full journey will be reduced well below the present figures of 8¾ hours.

The express and goods locos each weigh 79½ tons and are able to haul loads up to 500 tons at average speeds of approximately 55 and 43 m.p.h. respectively, their power output being equivalent to approximately 1,700 h.p. each. The two classes of locos are identical in all points save one—the design of toothed gears operating between the motors and the loose shaft. An express passenger loco can be converted for goods work at a moment's notice, however, merely by changing the gears.

Current is supplied to the locos at 16,000 volts by overhead transmission wires.

* * * *

New Coaling Plant at Doncaster

A new electrically-operated coaling and sanding plant has recently been erected at the L.N.E.R. Doncaster Sheds. Consisting of a Mitchell patent wagon double hoist, the equipment hoists 20-ton wagons to a height of 60 ft. 6 in. above the rail level and then tips the coal into an overhead bunker that will hold 500 tons. The bunker is divided so that two qualities of coal can be stored, and accommodation is provided also for 20 tons of dry sand. Coal can be tipped into the bunker at the rate of approximately 240 tons per hour, the coal wagons being hoisted from the ground, emptied, and replaced on the rails in less than four minutes!

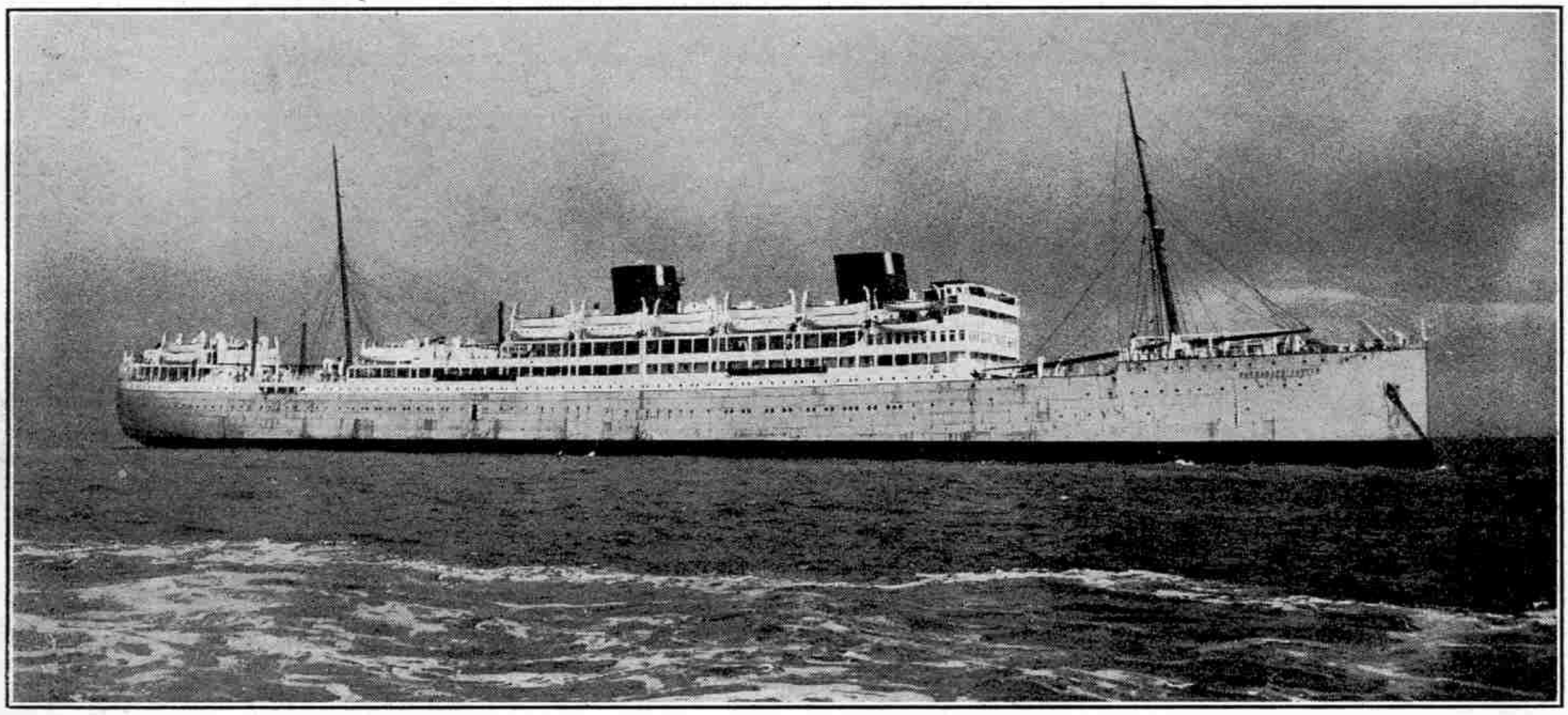
The hoist of this apparatus requires the attendance of only one man when locos are being coaled. In the course of its delivery to the tender the coal is automatically measured, and a simple record of the amount of coal used by each loco is readily obtained.

* * * *

The North British Locomotive Co. Ltd., of Glasgow, have recently secured an order for twenty 2–8–4 side tank, superheated locos for use on the Antofagasta and Bolivia Railway's metre-gauge.

World's Second Largest Motor-Liner

The "*Carnarvon Castle*"—A Floating Hotel for South African Trade



ONE of the most interesting among recent examples of the shipbuilder's art is the Union Castle Mail Steamship Company's "*Carnarvon Castle*," a twin-screw vessel of imposing dimensions. She is of over 20,000 tons displacement and measures 655 ft. in length and 73 ft. in breadth. She is the second British ship to be propelled by two double-acting four-cycle motors of large power and is the biggest and most attractive vessel that has yet been designed for the South African trade. Her construction embodies the latest advance in naval architecture and marine engineering and she has ample accommodation for 1,500 passengers and crew.

The vessel is divided into twelve compartments, seven of which are cargo holds while the remainder are available for passenger accommodation. In addition to the usual wireless installation it is interesting to note that special arrangements have been made for repeating band music at various points in the ship by means of powerful transmitting apparatus.

A Floating Hotel

Anyone suddenly transported to the "*Carnarvon Castle*" might well imagine himself to be in one of the large London hotels, so luxurious are her furnishing and fittings. The lofty Reception Room, for instance, is decorated in the style of the English Renaissance period. The design is copied from the Board Room of the New River Company, a wealthy Corporation of the latter half of the 17th century, which, by the way, was mentioned in our September issue in our account of the life of Sir Hugh Myddelton, the famous engineer, who was connected with the New River Company.

This Reception Room is connected with the Dining Saloon by arched openings, and the two rooms contain many fine pictures, including a series of oil paintings of Carnarvon Castle throughout the ages, commencing with a view of it in 1294. Another painting shows the castle as seen from the sea in the Middle Ages, with shipping and boats of the period, and all the life and bustle of the times depicted in the picturesque trappings and in the gay heraldic colours of the flags, arms, and costumes of the sailors and noble officers as they crowd through the water gate to their ships. Two other pictures of this historic pile show some of the military ceremonial life that passed in pomp and circumstance through the tall gateways.

The main Entrances and Staircase from the Reception Room to the Promenade Deck are panelled in natural sycamore, with a richly modelled cornice in white. Natural mahogany is employed for the pilastered door and window cases and a charming contrast is obtained by the use of the two woods. The staircase has a very fine wrought iron balustrade.

The Lounge is designed in Louis XVI. style, with coupled columns supporting a high dome with a wrought iron laylight. At the after end is a fireplace with a mirror over a marble mantelpiece. Separating the Lounge from the Staircase is a handsome colonnade of pilasters with arches and balustrade between.

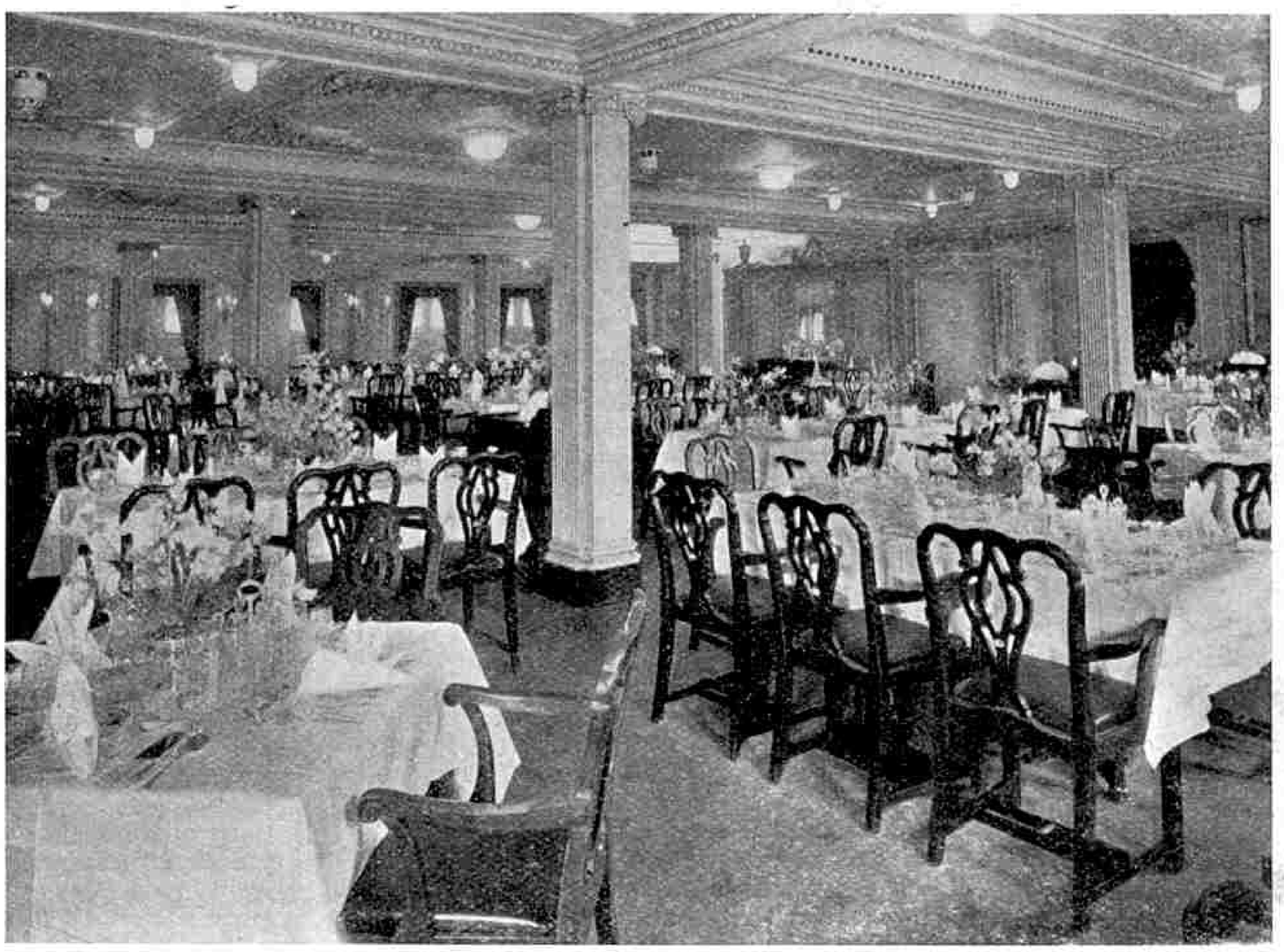
Reading, Writing and Smoking Rooms

The Reading and Writing Room is in the same style as the Lounge, from which it is entered, and as it is the most forward room in the ship it has windows on three sides giving fine views. Several bookcases are introduced

in the wall panelling, and in the centre of the after end a fine marble mantelpiece is fitted.

The Smoking Room is aft of the Lounge, with which it communicates through vestibules, and is designed to be a snug retreat in the style of the Dutch in the latter half of the 17th Century. The wall panelling is in oak of an age-darkened colour. The spaces between the windows and pilasters on the walls are divided into panels with the top row of panels filled in with balusters, which makes a novel feature suggested by the sleeping arrangements in Dutch houses of the period. The sleeping accommodation at that time was arranged in recesses of the walls of the living rooms, with cupboard doors to them and with the upper panels pierced to give air to the slumberers.

The Verandah Cafe, based on the lines of a famous stoep at Pretoria, is open at the after end, and provides all the amenities of sitting out on deck with the advantages of shelter from the midday sun or the colder winds of the morning and evening.



Courtesy [*"The Shipbuilder"*

The First-Class Dining Saloon

The Second-Class accommodation includes Dining Saloon, Children's Saloon, Smokeroom, Lounge, and Verandah, all designed and furnished in a superior manner, while the accommodation at the disposal of Third-Class passengers is on a spacious scale, with the latest equipment and furniture.

Oil Engines of 20,000 h.p.

The outstanding feature of the ship is, of course, the propelling machinery. This consists of two 8-cylinder 4-stroke double-acting Diesel engines, of the Harland-Burmeister and Wain type, capable of developing 20,000 h.p. They are the largest marine Diesel engines in service, and are only equalled in power by another similar installation of the same type. The manœuvring controls of these engines are at floor level at the centre of the engines, each of which can easily be controlled by one man.

From the top of the columns downwards the engines are practically indistinguishable from the single-acting engines of the same type, and the same may be said of the top cylinder covers with their push rods and valve gear. The crank cases are totally enclosed, and forced lubrication is used. The pistons are oil cooled, and the cylinder jackets and covers are cooled by means of fresh water. The valve gear for the top and bottom cylinder covers is worked from a single camshaft, in conjunction with two weigh shafts for manœuvring.

Each engine drives its own twin-blast air-compressor off the forward end of the crankshaft, the flywheels and electrical turning gears being fitted aft.

Electrical Equipment

The auxiliary machinery in the wings of the ship for the use of the main engines consists of electrically driven pumps for salt water, fresh water, lubricating oil and fuel oil, also coolers for fresh water and lubricating oil, and sets of filters.

Four auxiliary Diesel generator sets are arranged in a room forward of the main engine room. Each set consists of a 4-cylinder Diesel engine coupled to a D.C. dynamo, mounted on a common baseplate. A separate jacket cooling system is arranged for the auxiliary engines.

Electrical power is extensively used in the "*Carnarvon Castle*," the whole of the deck and machinery auxiliaries being electrically operated. These auxiliaries include capstans, windlass, warping and cargo winches, and an electrically operated boat gear consisting of 16 motors.

All the water-tight doors on the tank top are also electrically controlled from the Captain's bridge, and the steering gear is of the Wilson-Pirrie electric type.

The main as well as the auxiliary machinery for the refrigerating plant is electrically operated, as also are the engine room auxiliaries, of which there are over 50. The electrically-operated "service" motors in the ship include :—Passenger elevator and engineers' hoist ; dough mixer ; ice-cream machine ; cake mixer ; cake whisk ; knife cleaner ; coffee mill, and printing machine.

In the Gymnasium there is an electrically-operated percussion machine, camel and horse, etc. Electric motors are used also for driving the Laundry apparatus.

The whole of the heating throughout the vessel is carried out electrically, while there is a complete system of electrically-driven pressure fans in addition to the usual ceiling and cabin fans fitted throughout the accommodation.

As already mentioned, the "*Carnarvon Castle*" is the second British-owned vessel to be propelled by two double-acting four-stroke oil engines of large power, the first being the R.M.S.P. "*Asturias*," delivered to her owners last February. The "*Carnarvon Castle*" left Belfast at the end of June to undergo her official trials and subsequently took up service at Southampton. Preliminary speed trials in the Firth of Clyde were very gratifying, a speed of over 18 knots being attained over the measured mile at Skelmorlie.



Air News of the Month

New African Air Route

Reducing the time of the journey from London to Kenya Colony, and forming the first opened section of the proposed Cape to Cairo air line, a new aeroplane service between Khartum and Kisumu, on lake Victoria Nyanza, will be put into operation next month. The service will be provided by the North Sea Aerial and Transport Company, which has entered into an agreement with the Uganda, Kenya and Sudan Governments to make twelve flights each way on seaplanes of a similar type to that employed by Sir Alan Cobham on his Australian flight. The machines will differ in only one respect—the engines will be Bristol Jupiters.

The route will lie along the valley of the White Nile, the principal stopping points being Kosti, Malakal, Shambe, Mongalla, Nimule, Butiaba, Namasagali and Kisumu.

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The Avia Light Aeroplane

The advocates of the light aeroplane continue to receive considerable encouragement in the shape of performances of outstanding efficiency by these tiny machines. Among the best accomplishments yet recorded is that of an Avia machine fitted with a 60 h.p. Walter engine, which flew from the Prague aerodrome to Paris and back, a total distance of 1,180 miles, in 13¾ hours without stopping. The machine was piloted by Lieut. Jira, a well-known Czecho-Slovakian airman.

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Monster Aeroplane for Japan

One of the largest aeroplanes in the world is at present under construction in the Dornier works at Friedrichshafen to the order of the Japanese Government. The machine is a flying boat providing accommodation for 100 passengers, and its wings will have a span of 230 ft. It will be fitted with twelve engines each developing 450 h.p.

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"Aerial Golf"

A game played from the air by pilots seated in fast light aeroplanes is the newest development of sporting aviation. The machines fly at an altitude of approximately 100 ft., and endeavour to cast small bags, containing flour, on to a small target placed on the ground. The bursting of the flour bag indicates the position of the ball and the nearest to the "hole" wins. The sport is being taken up enthusiastically by a number of well-known pilots and one may look forward to hearing of further matches in the near future.

* * * *

The Supermarine Flying Boats

The first long-distance cruise made by R.A.F. flying boats was successfully completed recently by the arrival at Plymouth of the two Supermarine Southampton flying boats. The machines had made a round trip to Egypt and Cyprus, the outward journey being by way of Bordeaux, the River Garoune to Berre, near Marseilles, Naples and thence to Malta. From Malta the machines turned south to Benghazi on the Northern Coast of Africa and then proceeded to Aboukir, Haifa and Cyprus.

The return journey was made via Aboukir, Athens, Corfu and Malta, the remainder of the trip being over the same ground as that covered on the outward flight. The total distance covered was just under 6,100 miles and the machines kept to the time schedule throughout. Napier-Lion engines were employed and each machine carried a complete wireless equipment.

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A Five-Engined Seaplane

The large five-engined flying boat constructed in France by the Chantiers de Penhoet, of St. Nazaire, has recently been undergoing trials, but it would appear that it is not altogether an unqualified success since it is very slow in responding to its controls when flying with the engines off at low speed. Fitted with five Gnome-Rhone-Jupiter engines, developing 420 h.p. each, distributed along the span of the wings, the machine is a cantilever monoplane and has one hull only, which is a timber and fabric construction.

The machine is 88 ft. 9 in. in length and has a wing span of 131 ft. It is 26 ft. 4 in. in height and when loaded will carry approximately 35,200 lb. Its estimated maximum speed is 100 miles per hour.

* * * *

Huge Air Boats

New British all-metal airboats, larger than any previously attempted in this country have been put under construction. These flying-boats are intended for employment on the routes between Southampton and Cherbourg and across the North Sea to Copenhagen and Germany, and will be driven by engines developing 1,400 h.p.

These services will be maintained with the object of acquiring further knowledge and experience before opening the long distance air-boat services over the seaward portions of the London-Australia air route.

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Home Defence Air Squadrons

The new Home Defence air squadrons are to consist of Horsley-Rolls-Royce machines, 50 of which are now being built for the Air Ministry. The machines will be equipped with 700 h.p. Rolls-Royce Condor engines and will be able to fly at 100 m.p.h., while carrying a full load of bombs, at a height of over 20,000 ft. At this altitude the machines would be practically invisible from the ground and would be a hopeless target for anti-aircraft guns.

The Horsley-Rolls-Royce machine was chosen after a competition between four leading British aircraft manufacturers.

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Air Route to India

Two of the huge passenger aeroplanes to be used on the Cairo-Karachi air route will leave England for their bases on the 15th and 20th of this month, and on the 27th Sir Samuel Hoare, Secretary for Air, will leave in a third machine on a 6,500-mile flight from London to Delhi. This flight will include the 2,500-mile Cairo-Karachi route and will constitute the official opening of the new air service, for which, it will be remembered, de Havilland "Hercules" machines are to be employed.

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Weather Reports

The Air Ministry have introduced an interesting new scheme for advising cross-channel pilots of the weather conditions that they are likely to encounter. Four large white rectangular patches have been marked out at the Croydon, Biggin Hill, Lympne and St. Ingelvert aerodromes and, by super-imposing the symbols of a code upon these patches, a pilot, flying perhaps thousands of feet above, can read at a glance the general conditions of the weather, and the visibility and cloud locations ahead of him.

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Venice-Vienna Route

The tri-weekly service between Venice and Vienna is shortly to be converted into a daily service. The distance between the two cities is 370 miles and this is covered in approximately four hours, despite a regular call at Klazenfurt. The machines in use are Junkers monoplanes and Caproni biplanes.

Air Progress on the Continent

The extraordinary activity of German aircraft manufacturers is a reflection of the unbounded faith of Germany in the future of civil aviation. Deprived of the right to construct for military purposes, the whole force of the country's endeavours has been concentrated upon civilian air transport, and as a consequence there are approximately 25 regular air services in operation within Germany itself. Each of these services receives a subsidy, either from the municipalities between which it works or direct from the State, which takes the view that the greater the number of internal air services the bigger the number of passengers for the international lines.

Germany is working to a definite end—the development of international air communication and control of the Continental services. So long as her machines are debarred from crossing French territory, that control cannot pass into German hands, but the removal of that restriction, in July, 1927, will facilitate her programme. Arrangements already are in hand for a service between Berlin and the Spanish port Seville, and thence to Buenos Ayres.

The seaplane flight from Spain to South America in the early part of the year was a preliminary run, carried out by Spanish pilots and a Spanish machine but backed by German enterprise. The close co-operation existing between Spain and Germany in aeronautical matters is no secret, for, debarred by the Treaty of Versailles from building airships in her own country, Germany, through the Zeppelin Company, is building a ship in Spain for the Seville-Buenos Ayres service. This airship will be known as L.Z.127. It will be approximately 770 ft. in length and will be able to carry cargo and passengers to a total weight of 15 tons. Further services are contemplated to India.

Neither France nor Italy is remaining idle, however, and both are preparing schemes for trans-Atlantic and other long-distance services. France recognises the need for a more intense programme of domestic aviation, since only by that means is it possible to secure an adequate supply of pilots. Municipalities and Departments are being urged to give the matter deep consideration and wherever possible the French Government is prepared to give financial backing.

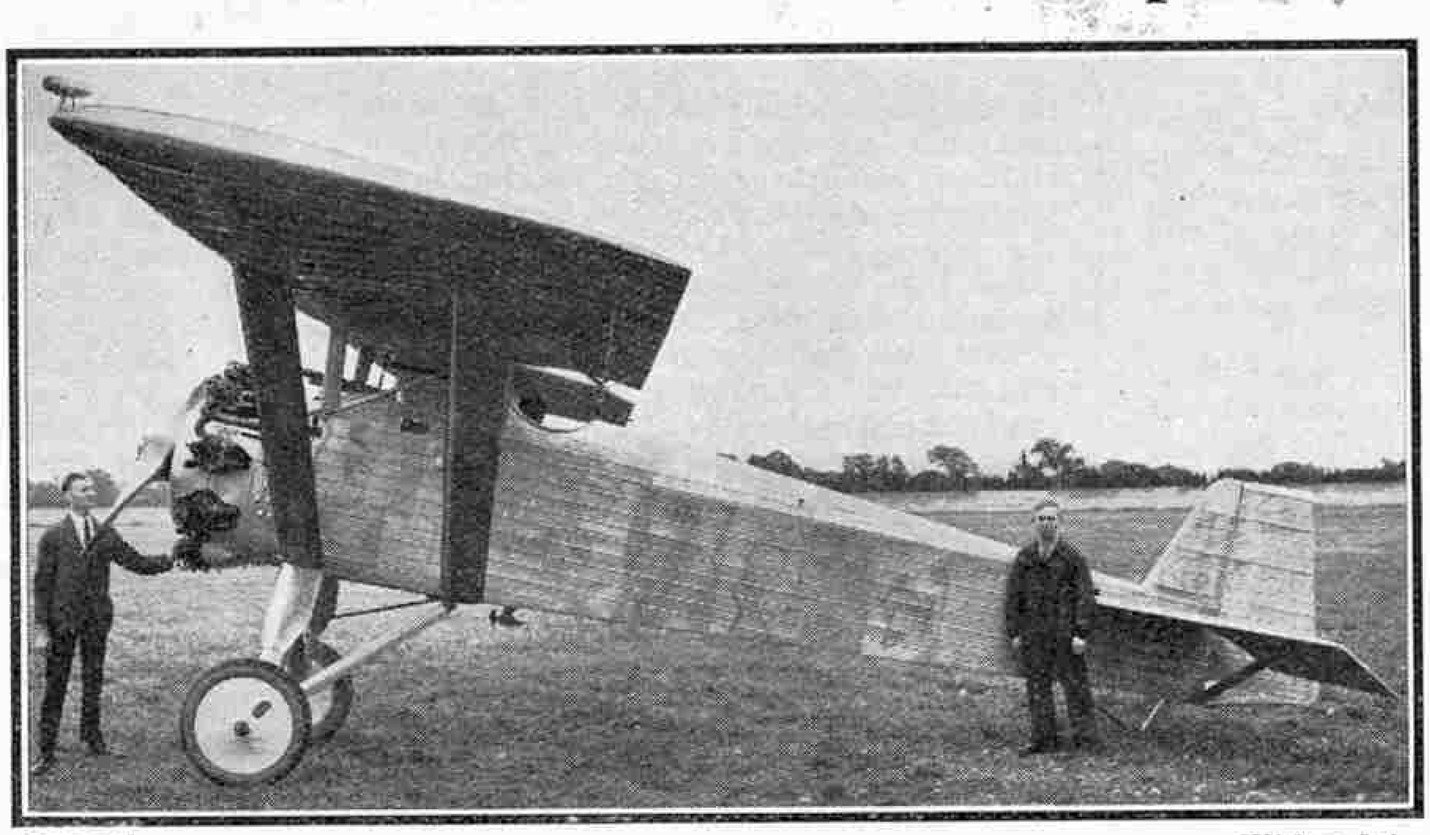
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Vickers Ltd. are proposing to inaugurate an aerial transport service in Australia. Sir Alan Cobham, on his return from his recent flight expressed the opinion that Australia might be termed one vast aerodrome. It is an ideal country for aviation.

An Aeroplane Show-Room

Definite signs of the increasing popularity of private flying are not lacking. The latest portent is the opening of an aeroplane show-room in London where the prospective owner-pilot can inspect the latest in flying machines just as his motoring friends inspect cars. At present a full size D.H. "Moth" is on show and quite a large number of inquiries have been made.

Another "All-Metal" Aeroplane



Courtesy] [*Vickers Ltd.*

The Vickers "Wibault"-all-metal single seater Fighting Scout, fitted with Bristol "Jupiter" Engine. This fine looking machine will be fully described in an early issue

A Real "Sky-Pilot!"

A proposal to provide an Australian minister with an aeroplane for use in visiting the outlying portions of his parish, which is almost as large as the whole of England, is being considered by the Church of England authorities. The clergyman in question, the Rev. L. Daniels, rector of Wilcannia, New South Wales, stated at a recent meeting in England that at present many of the settlers within his district could only be provided with three services a year. Mr. Daniels, it is interesting to note, served as an air pilot during the war.

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Air Lines in Conference

A meeting of representatives of twelve European countries has been held in Berlin to discuss various points affecting the international air routes. Among other decisions, it was agreed to issue a standard form of through ticket for rail and air between any two points on the European air routes. This ticket will be printed in three languages, of which English and French will appear on all tickets. Presumably the third language will be that of the issuing country.

* * * *

Lancashire Flying Club

The first year's working of the Lancashire Flying Club, one of those approved under the Air Ministry's training scheme, has been highly successful. Altogether over 4,000 flights have been made, with a total flying time of 785 hours. This represents an approximate mileage of 51,000. No serious accident has occurred and only three minor mishaps to machines have been reported.

The "Rumpler" Hydro-Aeroplane

We are now able to give further details of the "Rumpler" hydro-aeroplane, briefly referred to in our September notes.

Apart from its huge size, the machine is interesting in that its design calls upon each section of the wings to take its share of the machine's weight. In this way a closer relationship between the unit of useful load carried and the weight of the machine is secured. In machines of normal design an increase in size is only secured by an increase of weight in the wings disproportionate to the increase of weight-lifting power obtained. This is due to the placing of the main weight of the machine in the centre.

The "Rumpler" machine will have a wing span of approximately 115 ft. and will weigh 115 tons when fully loaded with its crew of 25 and its 130 passengers and their baggage, in addition to the ordinary requirements for a long-distance flight. The fuel is stored in 40 separate compartments, four to each of the machine's ten floats, and will be pumped to the engines.

When the details of the machine were first made known it was understood that flying-boat hulls were to be used instead of floats, but apparently the large number of floats will afford perfect security against capsizing, even in bad weather, when riding at moorings. It is anticipated that a maximum speed of 150 m.p.h. will be obtained and that a flight from Hamburg to New York, via Plymouth and the Azores, will occupy about 36 hours. The machine's most effective speed from the viewpoint of economical and reliable working will be 120 m.p.h.

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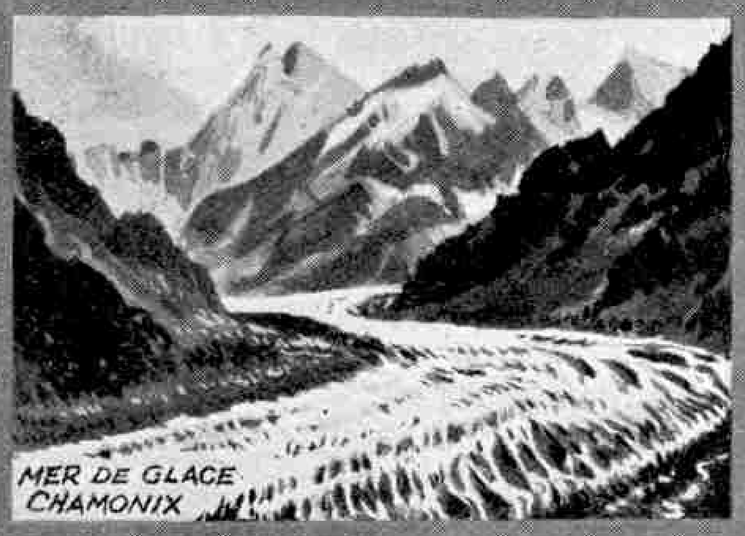
Canadian Aviation

During 1925 there were 3,171 flights by aircraft in Canada, the approximate mileage covered being 256,000. This figure is slightly lower than that of 1924, but represents a big increase over the 1923 mileage. The important feature of Canadian flying for the year is that there was no aircraft accident involving loss of life. This fact should serve to stimulate public confidence in aviation and it is probable that the figures during the next few years will show a steady advance.

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Karachi Airship Base

Work is going forward steadily on the construction of the new airship base outside Karachi, which will form one of the links in the chain of Imperial air services. Recently the first section of the steel structure for the airship shed was hoisted into position and bolted on to its bed of solid concrete. A gantry standing over 200 ft. in height was used for this operation.



Our Wonderful World

Movements of Glaciers

Recently observations show that although certain Swiss glaciers are advancing, the majority are retreating. Out of 100 Swiss glaciers observed in 1925, 19 were advancing, 11 were stationary, and 67 were retreating.

During the year, the well-known Salienz glacier advanced by 63 ft., and the lower Grindelwald glacier by 29 ft. The Aletsch, Allalin and Upper Grindelwald glaciers retreated, respectively, 30 ft., 30 ft., and 50 ft. One result of this retreating movement is that the glaciers are now in a broken condition, deep crevices being formed rendering them difficult and dangerous to cross.

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Water Diviner in India

In India an official water diviner, Major Pogson, has succeeded in locating numerous underground currents and in calculating their approximate depth. In the "trap" districts of Ahmednagar, Sholapur, and Bijapur, where the water scarcity is most felt, 53 wells have been excavated on sites recommended by Major Pogson. Of these, four have not yet reached the depth at which he predicted water would be struck. In 47 cases water has been struck and only in two cases was water not found, although the predicted depth had been reached.

These results are not due to particular local geological knowledge, as Major Pogson has also worked successfully in many parts of India, including the Nilgiris, Rajputana, and the North-West Frontier.

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New Solar Observatory

Dr. C. G. Abbott, a famous American astronomer, has been searching for a suitable site for a new solar observatory in the Eastern hemisphere. He has recommended a site near Quetta, in British Baluchistan, and here an observatory will be erected by the Smithsonian Institution.

The new station will be used for making daily observations of the sun's radiation, and the results will provide a check on the values obtained from the other two existing stations, Chile and California. It is believed that ultimately long-range weather forecasting may be possible when the new station is working.

* * * *

World's Largest Map

The Chairman of the Traffic Commission recently referred to Sir Henry Maybury's map of London as being "the largest map in the world," but he was not correct, for the largest map is in San Francisco.

This map costs £20,000 to produce and its completion occupied Mr. J. T. Edwards and his twenty-five assistants about eighteen months. It is 200 yards in length and six yards in width, and shows the whole State of California in relief. Some idea of its scale can be gathered from the fact that roads are an inch in width and railway tracks half-an-inch, and the main buildings in the cities are easily recognisable.

* * * *

Discovery of an Ancient Mirror

Excavations recently made on a 1st century cemetery site, of Roman origin, at the old market town of Baldock in Hertfordshire, have resulted in the finding of some interesting objects. These include Roman burial urns, containing cremated remains, beakers, dishes, jugs, and vases.

One of the most interesting objects unearthed is a square mirror of white bronze (speculum metal), which was probably attached to the inside lid of a Roman lady's toilet box. Even after the passage of centuries, this ancient mirror at once reflected when looked into without having to be cleaned.

* * * *

Largest Clock in the Empire

The largest clock in the British Empire, that on Singer Building at Glasgow, has recently been installed with an impulse transmitter. This works a "waiting train" movement similar to that of the famous "St. George," on the Liver Buildings, Liverpool, which clock was fully described in our issue of February 1925.

The Glasgow clock will therefore now be timed in the same way as an ordinary 12 in. office clock, by a standard Pul-synetic transmitter, which drives a number of ordinary impulse clocks situated about the offices and extensive workshops of the Singer Co.

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Solid Carbon Dioxide

A new means of producing solid carbon dioxide has been evolved in America. Briefly described, the process consists in compressing flue gas containing a big percentage of carbon dioxide, separating the water and other impurities from it, and then expanding the gas in a specially-designed gas turbine. The carbon dioxide emerges from the turbine in snow-like form and is then pressed into blocks. When required for large orders the solid gas is packed in boxes made of a very light fibrous wood possessing good insulating properties.

It has been found that a 10-inch cube of solid carbon dioxide weighs approximately 38 lb., and will maintain its frozen state for from five to seven days even though it be poorly insulated. The main use of the material is for refrigeration purposes.

New Submarine Camera

A new type of submarine camera, built to the design of experts of the American National Museum and the Smithsonian Institute, is being experimented with at the Marine Biological Station of the Carnegie Institution at the Tortugas. The camera is a marked improvement upon previous apparatus of a similar nature, especially in that it is not so bulky or awkward to handle. In spite of its smaller size, however, it will carry a roll of 400 ft. of film as compared with 16 ft. carried by the old type.

The photographer will require no special equipment beyond a diver's helmet since the depth at which he will work normally will be only from 10 ft. to 12 ft. The camera will be handled just as though it were mounted on a tripod on land. It is hoped that the new apparatus will shortly reveal many of the fascinating mysteries of life at the bottom of the sea.

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Broadcasting by Electric Light Mains

A system of broadcasting speech and music by means of the ordinary electric light mains has been perfected by Mr. John Chisholm, the inventor of the secret wireless system recently adopted by the War Office.

The apparatus consists of a transformer operated from a power or cable station, and a special type of receiver in the home. The cost of this receiver to the householder will be approximately £1. The transmission may be from a studio at the power station, or alternatively the ordinary wireless broadcast may be superimposed upon the electric light line. A loud speaker or a pair of headphones fitted to the special attachment is all that is needed in conjunction with the electric light switch and the operation of the switch as for lighting will set the instrument in action.

A feature of special interest in Mr. Chisholm's invention is that interference is entirely eliminated and generating "hums" also do not come through. It remains to be seen, however, whether the tonal reproduction will be as pure as that obtained by the present methods. The system has been tried out very thoroughly on a private electric supply plant and a demonstration on a larger scale is to follow shortly.

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An 800 lb. Fish

An extraordinary fish of the whale type was recently landed at Cherbourg. It weighed 800 lb., and was thrown on to the deck of the U.S. liner "*Republic*" by an enormous wave in the Atlantic. The impact of the fish wrecked part of the deck-fittings.

Surveying the Heavens

Chart of over 20,000,000 Stars

Nearly forty years ago, the late Sir David Gill, then in charge of the observatory at the Cape of Good Hope, realised the enormous possibilities of the photographic plate as a factor in the investigation of the magnitude, composition and periodicity of the stars. He suggested to the astronomical world that an International Survey of the stars should be undertaken. The project was taken up with enthusiasm and in the Spring of 1887 a conference was held in Paris, at which seventeen countries were represented.

It was agreed to construct a Photographic Chart of the whole heavens, to include all stars down to the fourteenth magnitude, numbering nearly 20,000,000 ! It was also arranged to make a secondary chart of all stars down to the eleventh magnitude, some 1,250,000.

Eighteen observatories in different parts of the world were included in the scheme and to each was allotted a definite area of the heavens. A specially important proviso was that the instruments employed at all the observatories were to be precisely the same, namely, photographic refractors of 13 in. aperture, with guiding telescopes of 11 in. aperture.

Each plate of the survey covers an area of four square degrees, and as duplication is employed to obviate error, about 22,000 plates have been required. Some idea of the work involved is gained from the fact that over 1,000 plates have been exposed at Greenwich, and at the Cape Observatory the number has been nearly twice as many.

Despite the fact that thirty years have passed, many observatories are still engaged on their section of the work and will not finish for another six years.

In 1899 the Paris Observatory issued enlargements from 96 of its plates and from these it is calculated that the complete chart will form a pile of paper standing 30 ft. in height and weighing two tons !

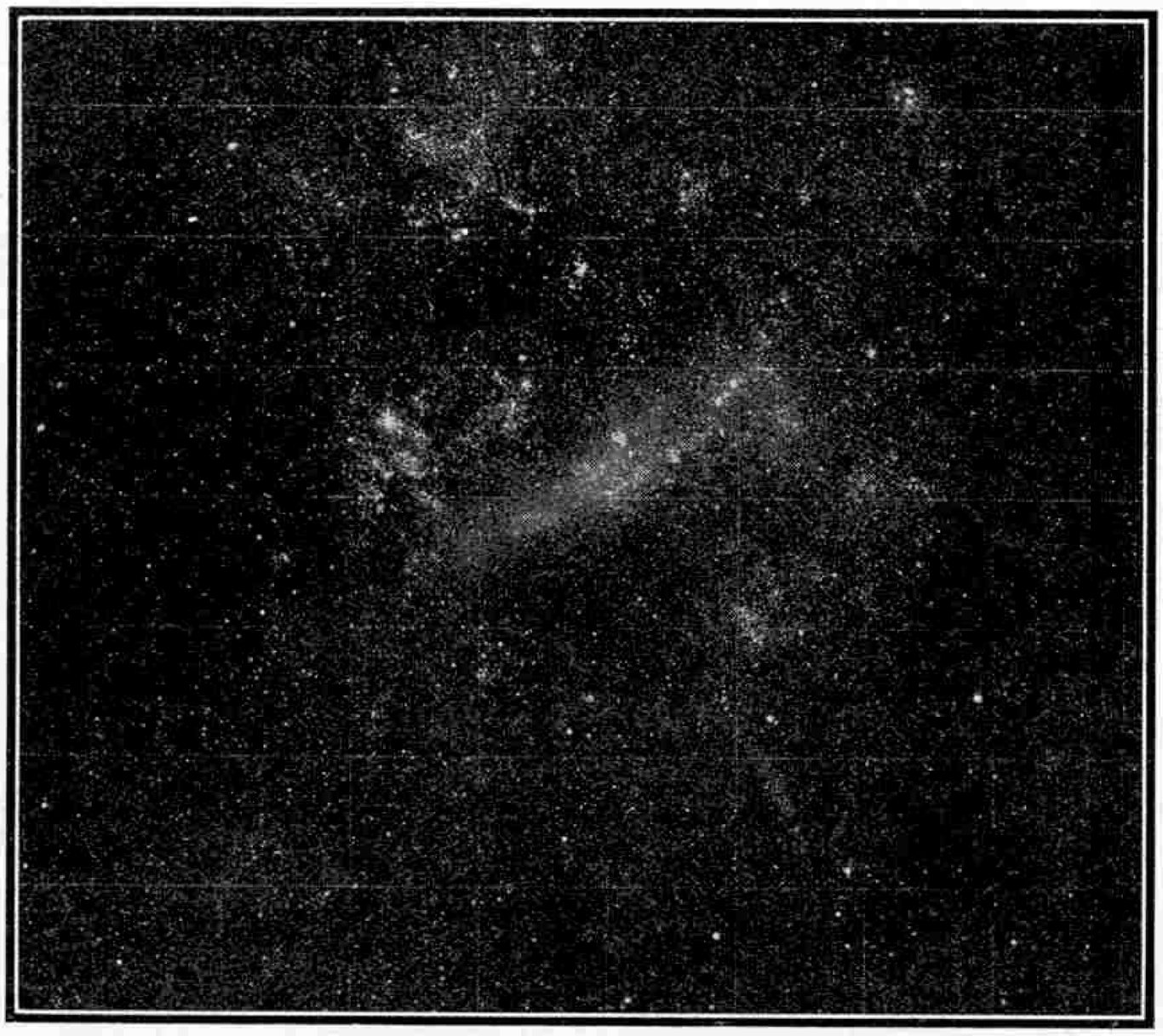
The ultimate value of this great map of the heavens cannot be too highly estimated, for already it is possible to determine from it the positions of millions of stars with an accuracy equal to that of direct meridian observations.

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Total Solar Eclipse in 1927

A total eclipse of the sun will be visible from certain parts of England in June 1927. This very rare spectacle will be visible from certain places on a line between Anglesey and Northumberland.

It is interesting to learn that no total solar eclipse will be visible in London for nearly 500 years, although on the 14th June, 2151, an eclipse will occur that will be almost total. On 7th October, 2135, a total eclipse will be visible a few miles north of London.



Part of the Milky Way, showing nebula and stars. A wonderful photograph taken at the Cape of Good Hope

" Finger Prints " from Cows

The wonders of modern methods of finger-print classification, and the resultant detection of criminals, are known to most of our readers. Now comes a further development of the subject—the identification of cows by their nose-prints !

In a big herd it is not always an easy matter to identify a cow—especially when the cows are without any distinctive markings. Often it is important to be able to make certain of a cow's identity, and it is then that the new system will be valuable.

It has been found that the lines and wrinkles on the soft skin of the nose are not alike in any two cows, the variation being as wide as in the case of the whorls and curves on the finger-tips of a man. Although the cow's nose grows, as time passes, the direction of the lines does not alter.

The taking of a cow's nose-print is carried out by passing an ordinary inking pad over the ridges of the nose, so that all parts are well inked. Then a piece of soft paper on a board is pressed on the nose and the record thus obtained is then filed and indexed. Identification of the particular cow is always then a matter of certainty.

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A Monster Iceberg

The international ice fleet—the patrol maintained by all the European nations and the U.S.A. to warn ships of ice—sighted a huge iceberg. It was the largest seen this year, and consisted of a million-and-a-half tons—an amount of ice that would supply the whole of London's wants for three months.

The patrol exploded 210 lbs. of T.N.T. in the monster berg, thus shortening its life by two days.

It is interesting to learn that no ship has been lost by ice collision since the patrol was instituted in 1913.

Gramophone and Wireless

At one time it was thought that the days of the gramophone were numbered, and that all interest in this form of reproduction of music would be killed by wireless and the loud-speaker, and gramophone manufacturers did not look at all kindly upon their artists broadcasting. This attitude is now changed, however, and information has been collected showing that the gramophone industry is busier than ever. This fact is attributed directly to the publicity obtained for various artists through broadcasting, for, with the development of broadcasting, the output of gramophone records has increased enormously, not only in this country but also in America. It is stated that, on a recent occasion when a certain prima donna broadcast, no less than 160,000 records of one particular song were sold immediately afterwards !

In America, where broadcasting restrictions are few and where a good deal of advertising is done by wireless, a gramophone company engages the original artists to broadcast songs for which they have also made records. The result is a considerable response in sales. Broadcasting has been in operation for about three years, and during this period not only have gramophone sales increased, but schools of music are fuller and music teachers are busier than ever.

Without doubt, there is a great future before the gramophone, and more particularly so if further developments are made to give more realistic reproduction. Incidentally it may be mentioned that one company has recently expended £50,000 on experiments in this direction, with very satisfactory results.

* * * *

Ultra Violet Light to Test Drinking Water

The transparency of water to ultra-violet light is now used as a basis upon which to test its purity. Chemically pure water for lengths of 10 cm. is transparent to wave-lengths well down in the ultra-violet. Although substances—that is to say, mineral salts—ordinarily found in what is called pure water fail to diminish this transparency, suspicious substances may render it opaque to a degree that is generally more pronounced according to the more serious or the more recent the contamination.

Ammonia, proteins and albumen show their presence by increased absorption in the ultra-violet. Sewer water, stagnant water, and water from house drainage all show opacity, even after being filtered. Well water from different sources, though transparent and colourless, distinguishes itself from pure water by its absorption. Water from a stream that has passed through a small town is more opaque than that taken above the town.

All About Railway Sleepers*

And the Systems Used for their Preservation

WHEN the Liverpool and Manchester, London and Birmingham, Grand Junction, Manchester and Crewe, and many other railways were constructed between 1830 and 1842, great improvements had already been made in the permanent way. Although stone blocks were originally used in places, such parts of the line as were laid on embankments or soft ground had the rails supported on wooden sleepers cut from round timbers sawn through the centre and from 9 to 10 ft. in length. These sleepers were laid with the sawn face downwards, their round top being adzed down to a flat surface on which the chairs could rest.

Objections to the stone blocks were that they were apt to split where holed for the chair connections; that they had little bearing area on soft ground, and that they in no sense acted as a tie gauge between the rails in the manner that wooden sleepers do.

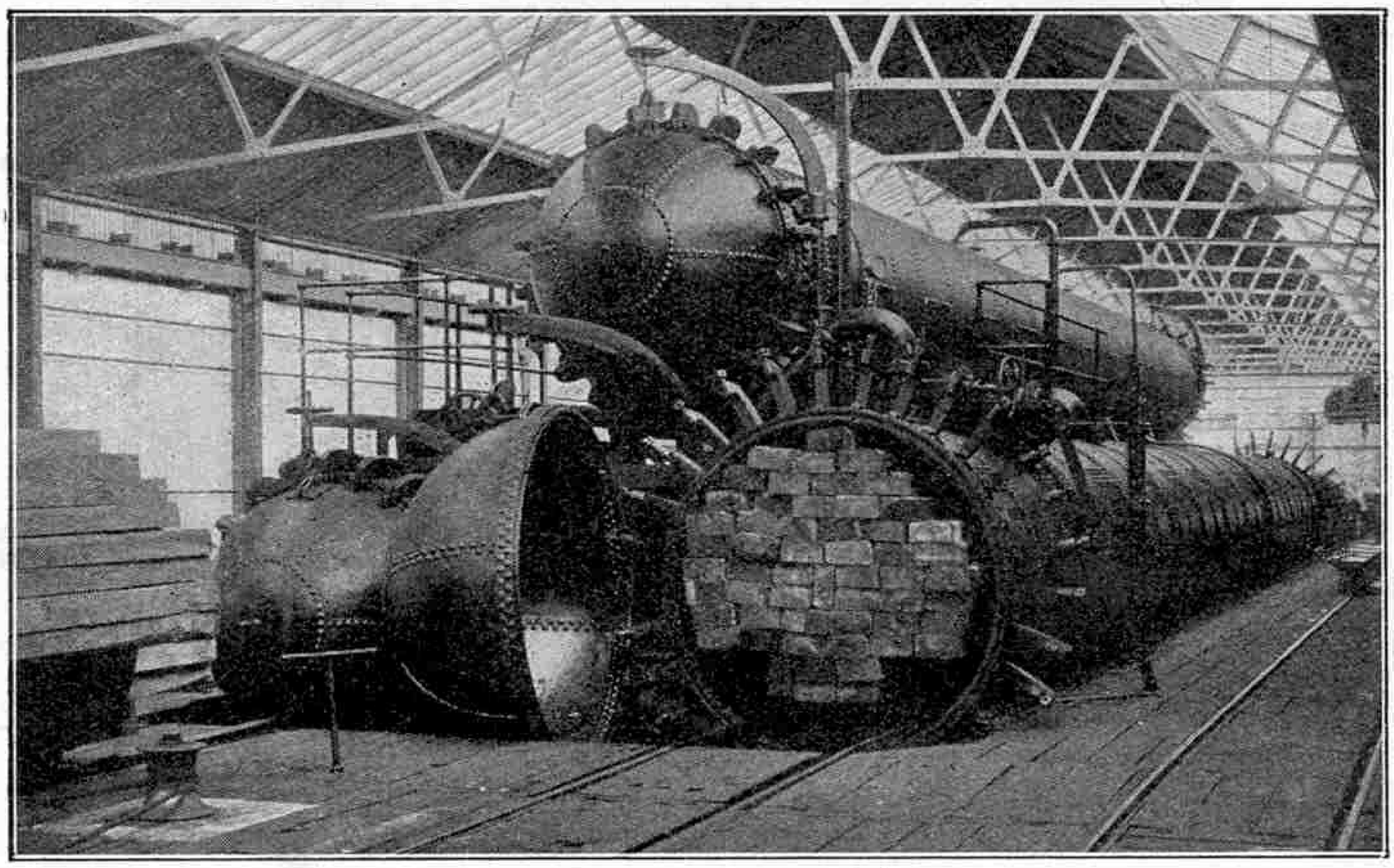
For these reasons the use of timber for sleepers rapidly became universal, but their short life, due to decay from natural causes, soon led to the introduction of artificial methods of preserving them. By 1838 there were no less than four separate systems for the antiseptic treatment of timber before the public in this country, viz.: 1. A solution of Mercuric Chloride (Corrosive Sublimate), patented by Mr. J. H. Kyan in 1832; 2. A solution of Sulphate of Copper, patented by Mr. J. J. Lloyd, Margary, in 1837; 3. A solution of Chloride of Zinc, patented by Sir Wm. Burnett in 1838; and 4. Heavy Oil of Tar (afterwards called Creosote Oil), patented by Mr. John Bethell in 1838.

Preserving Systems Employing Creosote

Of these four processes, Bethell's, or the "Full Cell" system, is to-day more generally used for the preservation of timber than any other.

The process consists of impregnating timber with Creosote oil in an iron tank under pressure, so coagulating the albumen, and filling up the pores of the wood with a bituminous asphaltic substance. This gives a waterproof covering to the fibres, destroys insects and fungi, and prevents the absorption of water. The system is also obnoxious to bacterial life and prevents dry rot.

Two modifications of Bethell's process (viz., Rüping's and Lowry's processes) are also worthy of mention. The Rüping system, which was patented in 1902 and is often called the "Empty Cell" process, consists of injecting 10 or 12 lbs. of Creosote into each cubic foot of timber. This is first subjected to a pressure of about 60 lbs. per square inch, the Creosote being under the same pressure as the timber, but in another cylinder. The Creosote is assisted into the cylinder containing the timber by a small engine and pump, and as soon as the cylinder is full of oil and timber the cylinder that contains the oil only is disconnected and the air pressure released. A pressure pump is then started and this injects more Creosote into the cylinder until the timber has received its correct amount, when the pump is stopped and the cylinder emptied of Creosote. The result is that the imprisoned air in the cells of the timber expels the surplus Creosote from it, leaving the cells merely smeared over with Creosote instead of remaining full. The timber is lastly subjected to a vacuum in order to remove the surplus Creosote from its surface, and there will not remain more than 4 to 6 lbs. of Creosote per cubic foot of timber, and sometimes even less.



Creosoting Cylinder Charged with Sleepers

Other Interesting Systems

The Rüping system is chiefly used in Germany and Italy, and to a certain extent in other countries, such as France, Switzerland, &c. In the United Kingdom it is principally employed for treating Government telegraph poles.

The Lowry system, which was patented in 1906 and is sometimes loosely spoken of as an "Empty Cell" process, is very extensively used in the U.S.A. at the present time. No vacuum is used at the beginning of the process, and when the creosoting is completed and pressure removed the imprisoned air in the cells of the timber helps to drive out a little of the Creosote. After a vacuum has been created there does not remain in the timber more than 7 or 8 lbs. of Creosote per cubic foot.

Creosote is also used in the Buehler process, the Boiling process, and the A.C.W. process.

Rutger's process employs a mixture of Zinc Chloride and Creosote, and is chiefly used in Germany, where it was patented in 1874.

The Card process, patented in 1906, also uses Zinc Chloride and Creosote, but differs from Rutger's process in the method of keeping the solution mixed.

The B.M. process is a modification of burnettizing, in which aluminium sulphate is added to zinc chloride.

The Wellhouse process consists of a solution of zinc chloride and glue, and although first tried in 1881 is comparatively little used now.

The Powell process consists of boiling wood in a solution of sugar, with a very little trace of arsenic, &c., but the exact composition of the solution is a secret.

In the Vulcanizing, or Haskins process, timber is placed in the treating cylinder, and air compressed to from 150 to 200 lb. per square inch is forced into the wood through a water separator to remove moisture, and heated to from about 400° to 500° Fahr. for about 8 hours.

There are other processes, such as

* *Reprinted from the "L.M.S. Magazine," by permission of the Editor*

Creoaire, Cresol-calcium, &c., but we have now mentioned all the best-known systems.

The Timber Used for Sleepers

Prior to the war Baltic Redwood or Baltic Red pine (*Pinus sylvestris*), from the great forests of Russia, Poland, Prussia and Scandinavia, was almost universally used for sleepers, while Scotch pine or Scotch fir, which is of the same family and indigenous to Scotland, was used in the Northern Highlands. Baltic Redwood possesses the useful property of readily absorbing Creosote.

In pre-war days the standard size of sleepers in this country was 9 ft. by 10 in. by 5 in., two sleepers being cut from one block. Sleepers were well seasoned by being stored in open stacks for about six months, after which they were passed through an adzing machine, which dressed a seat for the two chairs they were to carry. They were then bored for the chair connections, creosoted, and had the chairs screwed or otherwise fastened on to them. They were usually although not invariably laid heart downwards.

Due to shortage of timber during the war, consideration was given to reducing the length of sleepers from 9 ft. to 8 ft. 6 in., and in 1919 this became to some extent a standard. The new British standardisation of permanent way of 1922 provides for 24 sleepers being laid under a 60 ft. rail, the two adjacent sleepers at rail joints being 12 in. by 5 in. in section. For second-class and inferior lines the standard 8 ft. 6 in. by 10 in. by 5 in. sleeper is used.

The shortage of timber in the war period led to many companies using sleepers of various kinds of wood, and one result of this appears to be that Douglas fir (*Pseudotsuga Douglasii*), frequently called Oregon pine, but also known as British Columbian pine, is likely to come into use for sleeper purposes.

How Sleepers are Creosoted

After the drying, adzing and boring process previously described, the sleepers are run on small steel trollies into a steel cylinder provided with movable, hingeless ends, which are then made secure by hinged iron clamps, an air-tight joint being formed by a bed of spun yarn and fat.

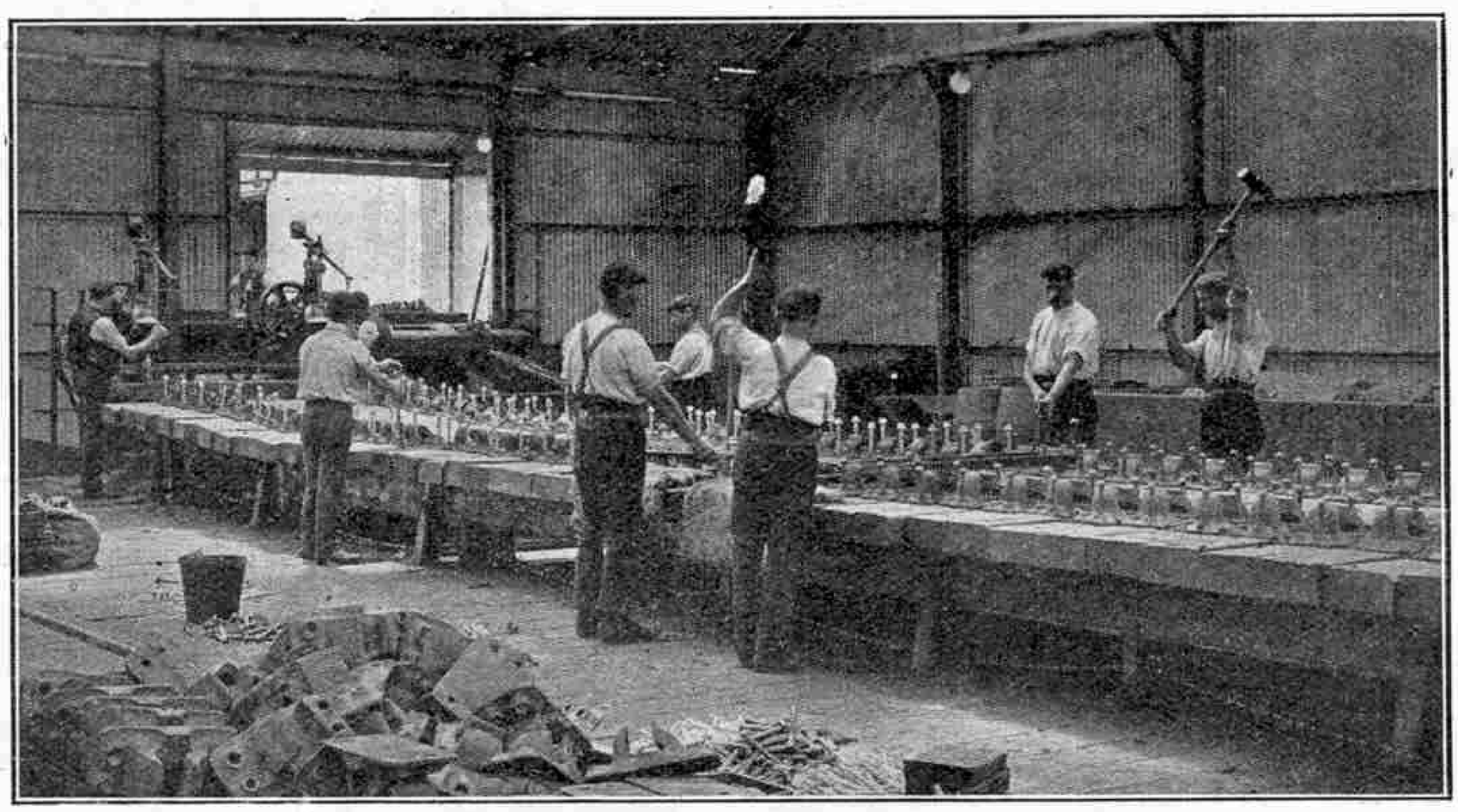
A vacuum of 15 in. is then created inside the cylinder, and a stop valve on a pipe under it which dips down into the tank of Creosote below, is opened, and the Creosote is at once sucked up by vacuum. The cylinder still requires 200 to 300 gallons to fill it, and this is quickly obtained from a storage tank fixed above it by opening a stop valve on a pipe connecting the two.

After this stop valve has been closed a pressure pump is started, and the correct quantity of Creosote—which amounts to about one gallon per cubic foot of timber—is forced in from the tank below for the timber to absorb. The pressure may vary from 80 to 180 lb. per square inch before the work is completed.

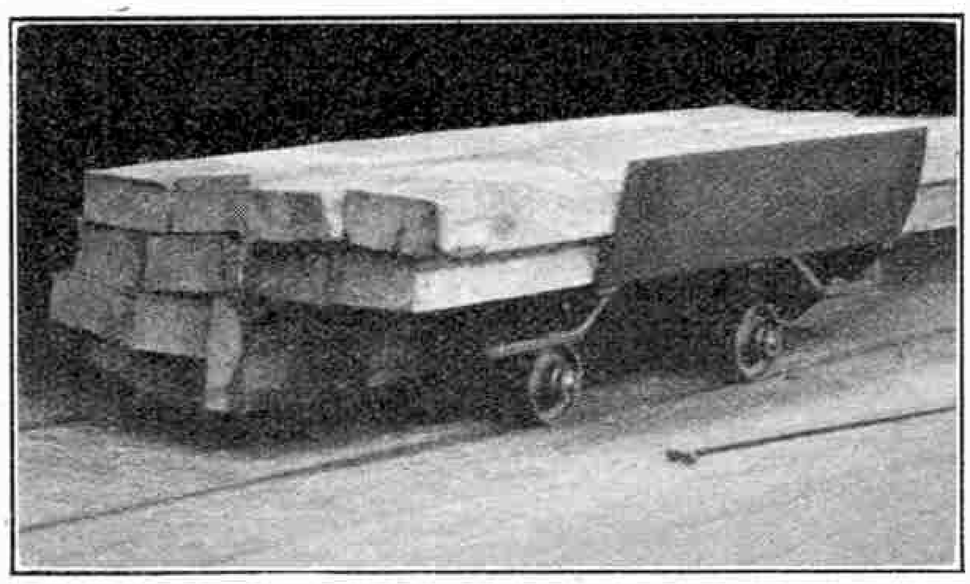
The time taken to creosote Baltic Redwood varies from 1½ to 2½ hours, according to the pressure, temperature of the Creosote, condition and quality of the timber, and time of the year.

After the surplus oil has been run off, and before the charge of sleepers is drawn out of the cylinder, a vacuum of 15 in. is created for 30 min., for the purpose of clearing the sleepers of the extraneous oil remaining upon them.

The Creosote is kept at a temperature varying from 100° to 140° Fahr., by steam pipes laid along the bottom of the storage tanks and in the cylinder. After the process is complete, the sleepers should retain about 0.88 gallons or 9.174 lb. of Creosote per cubic foot of timber.



Chairing and Screwing Sleepers



Timbers Loaded for Creosoting Cylinder

Creosote Oil—a By-product

Creosote oil is the name generally applied to the fraction of coal-tar distillate which boils between 200° and 300°C. It is one of the by-products obtained in the process of manufacturing coal-gas and is produced by the distillation of gas-tar, and also from coke oven and blast-furnace tar.

It is a greenish yellow, fluorescent liquid, usually containing phenol, cresol, naphthalene, anthracene, pyridine, quinoline, acridene and other substances, and is chiefly used for the preservation of timber. A standard specification of it for Engineering requirements was issued by the British Standardization Committee in August, 1921.

Life of Sleepers

On a good road-bed, and where they have been well maintained, properly creosoted sleepers of good quality may have a life up to 35 years. The uncreosoted Scotch pine sleepers, on the other hand, used during the war, had to be replaced on account of decay after a life of about four or five years.

Iron sleepers were experimented with as far back as 1880. They were of various sections, but their use has never become general in the United Kingdom, although they are extensively used in tropical and foreign countries, where the white ant rapidly destroys timber.

Some Costly Mistakes

In the early days of railways stone blocks were used for sleepers and they continued to be used up to 1841 or later. During the later days of stone sleepers wooden cross sleepers were gradually coming into fashion, the reduction in jolting obtained by their use being greatly appreciated by passengers. The main obstacle to the general introduction of wooden sleepers appears to have been their inferior durability as compared with stone blocks.

It is interesting to recall that Brunel, in his ceaseless endeavours to build a perfect road, departed from the practice of using cross sleepers and laid his rails on longitudinal sleepers. He certainly succeeded in obtaining a well-built road, but it proved to be too rigid, and ultimately the line was relaid on cross sleepers.

Brunel was not the only railway engineer to be led astray by the search for rigidity. On the Manchester and Leeds Railway (1839), for instance, on a section of the line passing through a rock cutting the chairs were spiked down direct to the rock. Apparently it was thought that the chairs would stay down for ever, but as a matter of fact they were all taken up in less than a month because rails and springs were broken wholesale unless the trains were slowed down to a walking pace!



Collapsible Boat

The usefulness of a light folding boat is now universally recognised, and our illustration shows the latest development of this interesting craft. This new invention packs into a compact bundle, the total weight of which is only 36 lbs. When afloat the boat is of quite a good size, and is propelled either by means of oars or paddles.

A great advantage in this particular design is that it is unsinkable, even when full of water, being fitted with airtight chambers along both sides.

* * * *

Fog Dispersing Apparatus

Numerous experiments have been undertaken from time to time with the object of eliminating or reducing fog—one of the greatest risks of flying—but so far with but little success. An apparatus for dispersing fog is now being developed at the Philadelphia Naval Aircraft Factory and is expected to give better results. The apparatus is mounted on a truck and comprises a simple charging screen, a transformer with rectifying device and an aeroplane propeller.

The possibilities of the device include the lessening of traffic dangers in large cities on foggy days and the minimising of peril and delays to shipping in crowded harbours.

It is stated that the new apparatus will electrify 700,000 cubic ft. of air per minute, and cut a path 2,000 ft. in width and 1,000 ft. in height through a fog in the same space of time.

* * * *

The Jean Bares Award to Inventors

Among the rewards given every year by the French National Office of Scientific and Industrial Research, is that known as the Jean Bares Award. This is offered to the inventor who is the father of at least three children and who is regarded as having rendered the greatest service to French industry.

For 1925 the prize, which amounts to 10,000 francs, has been awarded to M. Vedovelli, who has risen from being an engineering fitter to being an inventor with more than 100 patents to his credit. He has a wide reputation in connection with high-tension apparatus and control gear and was responsible for the luminous electric fountains at the Paris Exhibition of 1900, and 25 years later for the electric waterfall and other illuminations at the Paris Decorated Arts Exhibition of 1925.

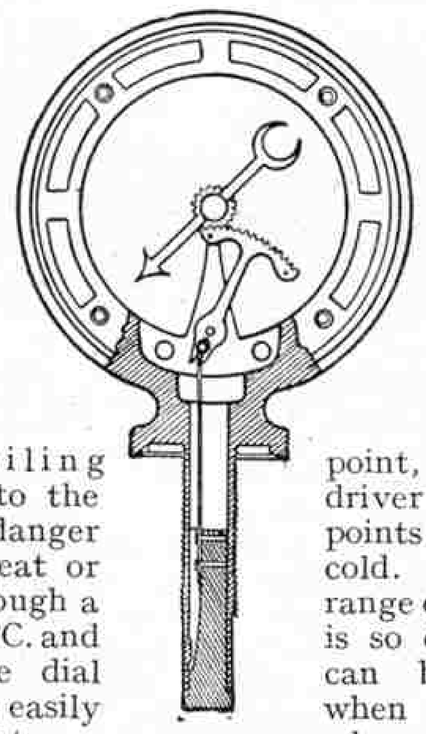
Temperature of Radiators

An interesting invention, the Calometer, has recently been placed on the market, to show the temperature of the water in the radiators of motor-cars.

The Calometer is fitted as part of the equipment of Morris-Oxford and Austin cars and no doubt many of our readers will look out for this interesting device on these and other makes of cars. The Calometer registers the temperature of the water in the radiator from freezing point to boiling point, and indicates to the driver of the car the danger points of extreme heat or cold. It operates through a range of 180°F. and 100°C. and is so designed that the dial can be read quite as easily when driving at night as when driving during the day, for it shows up against the white road illuminated by the headlights. This is a great advantage, as all similar devices are difficult to follow at night. Reading the register at night is made possible by the dial being left open, the markings being made permanently on the glass and the pointer is clearly seen silhouetted against the illuminated roadway.



Collapsible Boat



Sectional view of the Calometer

The construction of the Calometer is very simple, the principle relying upon the extreme responsiveness to heat variations of a strip of thermostatic metal. This constitutes a permanent union in one strip of two metals of dissimilar co-efficients of expansion. When heat is applied, the metal with the greater co-efficient of expansion is dragged by the less expansive metal, and instead of lengthening as it normally would, exercises a bending influence on the whole strip. The bending movement is then transmitted by a patented method through a quadrant and pinion to a pointer suitably mounted on bearings. The metal responds always immediately and accurately to the slightest change in temperature and does not fatigue.

* * * *

A Tennis Practice Invention

In an account of the methods of training Mdlle. Suzanne Lenglen, her father mentions the value of wall training, in which the wall acts as an adversary, returning the slow balls slowly, and the fast balls with almost equal speed. After a good deal of practice, the direction, and the degree, of the return shots can be accurately anticipated, so that a somewhat more subtle mute opponent becomes necessary.

To this end M. Bazille, of Paris, has invented a wall practice surface that is both movable and adjustable with a concave surface. It is capable of adjustment to any angle, or inclination, and so a greater variety of returns at unexpected angles is possible, and the monotony of the ordinary wall-practice is overcome.

* * * *

Inventions Wanted

Among the list of inventions most needed, according to the British Institute of Patentees, are included the following :—

(1) A smooth road surface that will not be slippery in wet weather. (2) A process to make flannel unshrinkable. (3) An aeroplane that can be managed safely and easily by a boy or girl. (4) Aero engines of 1 lb. weight per horse power. (5) A practical method of utilising the tides. (6) A process to extract sulphur from vulcanised indiarubber so that it may be "boiled up" and used again. (7) Talking and moving pictures. (8) Methods to reduce friction.

Here is a chance for brainy Meccano boys to make their fortunes

Teaching the Perfect Swing

Two American inventors have brought out an ingenious device to help beginners with their golf. The apparatus consists of an upright bar to which is fixed a pivoted bar fitted with straps.

The player is strapped in position and is allowed perfect freedom of movement along correct lines. The universal joints of the apparatus prevent him making an imperfect swing and at the same time correct two of the most difficult faults amateurs have to overcome in driving—those of drawing back from the ball and of reaching for it.

* * * *

An Electric Weapon

A German electrical engineer has invented a weapon that will instantly put out of action anyone whom the owner touches. The object of the invention is to enable the police to successfully tackle desperate characters.

The weapon is electric and is concealed in the hand of the owner. It consists of a small battery and high-tension coil, which can be carried in the pocket. Insulated flexible wire is carried from the coil inside the sleeve of the jacket, and two contacts are fastened to the palm of his hand by a strap round the wrist and a ring round the middle finger.

When the hand is open, the circuit is automatically closed, and it is then only necessary to touch the victim with the apparatus to put him out of action. The effect is not sufficiently powerful to endanger life, however, but the victim is stunned and having been made prisoner is taken away to the cells, where he recovers consciousness.

* * * *

Wireless to Detect Metal Thieves

Two German inventors have made an ingenious application of wireless to the detection of workmen stealing metal. The device depends on the principle of change of frequency that occurs when a piece of metal is introduced into a magnetic field.

The method of working calls upon the workmen, on leaving the factory, to deposit all metallic objects on a table placed near the cabinet in which the apparatus is installed. The workman then enters the cabinet and the attendant listens in with headphones for a change in the sound. If there is no change, the man has no metal upon him but should there be a change in the sound the man is concealing metal upon his person.

So delicate is the test that in the case of a man who had been wounded, the apparatus showed that he had metal on him, and it was only after an X-ray examination had shown that a bullet had entered his thigh that he was proved innocent of stealing metal.

* * * *

The Automatic Cow

A "cow" that gives new milk, skimmed milk, malted milk, cream, fruit-flavoured milk, and ice-cream to order; that never kicks or flicks its tail in the milkmaid's eye; that is never seasick, never dry, and that can be milked as well by a marine engineer in mid-Atlantic as by a milkmaid, is the remarkable "animal" taken on board the African and Eastern Trade Corporation's steamer "*Nigerian*," before she sailed from Liverpool recently.

This wonderful cow requires neither exercise nor grass and she delivers milk of any degree of creaminess and at any temperature to order.

All the "milkmaid" has to do is to give the machine—for such this wonderful invention is—a feed of milk powder, fresh butter, and a drink of water, press a button, and the cow does the rest. The milk is as rich and fresh as that from any dairy cow, and no amount of rolling



Invention to teach the Perfect Swing

on the part of the ship will sour it or churn it into butter.

The cow has already, by her quiet demeanour and ready response to kindness, won her way to the affections of the crew of the "*Nigerian*." "We shall be as rosy-cheeked as country girls, with a glass of new milk warm from the cow to go to bed with every night," declared one of them, before he sailed.

There is only one fly in the ointment so far as the crew is concerned. This is that neither milkmaids nor dairymaids have been shipped to look after "Topsy." The engineers and the cook will do that!

* * * *

A Mechanical Policeman

It is anticipated that the automatic traffic-regulating device, popularly known in Copenhagen as the "mechanical policeman," will render the employment of policemen on "point duty" at cross roads entirely unnecessary. The device works automatically by means of clockwork and shows a red light for "stop" and a green light for "proceed." A warning bell is incorporated in the system, and twenty seconds before the signals change direction this bell rings out its warning, while the lights in all four directions change to red. This, of course, facilitates the restarting of the "held-up" traffic.

The apparatus in use in London at the junctions of Piccadilly and Old Bond Street and Piccadilly and Berkeley Street is very similar in its operation, but instead of the intimation of the intending change of direction being by bell, the lights change from green and red respectively to yellow.

The Machine with Human Touch

Many acres in the flat districts of Lincolnshire and elsewhere are now being used for the growing of beet, required for the new industry of sugar-making. The gathering and trimming of these sugar beets involves a great amount of labour and recently a wonderful machine has been tried out to save a great deal of work that has hitherto had to be done by hand.

This machine—an American invention—pulls, "tops," and gathers the beets by a single unified process. One of its most remarkable features is the ingenious "feeler," by which it is able to distinguish between large and small beets. Instead of cutting the big roots in half and missing the small ones altogether, the revolving circular knife, which is part of the equipment, neatly "tops" all alike.

The machine pushes into the rows of beets, "feeling them by means of a tread belt, which lifts or lowers the knife behind it, and "topping" them while they are still in the ground.

Two long iron "fingers" then lift them gently from the soil and place them upon another moving band, which throws them into a collecting bin at the side.

The machine, which is known as the "Greyhound," will deal with a three-acre beet-field in a day at a cost, including labour and fuel, of 15/–, whereas, to gather the beet-harvest of a similar field by hand costs nearly £4.

* * * *

Wireless Lighthouse at Calais

At Calais there has been installed a revolving ray of high-frequency sound vibration for the guidance of shipping. By its means vessels are able to make their way through the Straits of Dover even in the thickest fogs and are able to enter Calais Harbour with as little hesitation as they do in the clearest weather.

High-frequency sound waves above the range of the human ear (their frequency is 40,000 vibrations a second) are directed in a beam, and take the form of a narrow submarine ray. This sweeps through a complete circuit three times a minute, thus resembling one of the shore revolving lights.

Simultaneously, with the sending out of this ultra-sound ray a wireless signal is broadcast, the operation resembling the flash and the boom of a gun. The wireless signal arrives instantaneously while the ultra-sound ray travels at the rate of some 4,700 yards per second. The navigator counts the seconds after the wireless signal until the sound-ray is heard and a simple calculation will give him his exact position in regard to Calais.

The apparatus is the invention of Professor Langerin, of Paris.

* * * *

Furnace for Refining Cast Iron

In the production of high quality pearlite cast iron in the ordinary cupola furnace, it is difficult to keep the carbon content low and regular. These difficulties are overcome in a new oil-fired flame cupola furnace designed with the oil burner, which is fed with tar oil, at one end, the charge being introduced at the other end.

The Hornby Control System

SIGNALS, POINTS, AND TRAINS CONTROLLED FROM THE SIGNAL CABIN

The remarkable development of Hornby Trains probably represents a feat of model engineering that has not been equalled since the invention of Meccano twenty-five years ago. From the day of their introduction, Hornby Trains have always represented the latest model railway practice, and their popularity has grown to such an extent that their name has become a household word. And now another new Hornby "thrill"—the Hornby Control System! Every model railway enthusiast can now arrange his layout so that he may control his clockwork trains, signals, and points by operating a set of levers in a convenient signal cabin. The following article, which will be concluded next month, describes the various components of the Hornby Control System in detail, and contains full instructions for the installation and operation of the System.

THERE is a certain amount of fascination about even the cheapest and simplest Miniature Railway.

For a time we can take a keen interest in a single train running round a plain oval track, but presently we realise that we need something more. Then we add points and crossings and so make possible layouts with branch lines and sidings. Still later, perhaps, we add further interest by introducing a more or less complete system of signals.

By this time our railway has become a source of keen enjoyment to us and to our friends, and for a while we feel that nothing more is needed. Sooner or later, however, our thoughts turn to the Signal Cabin on a real railway and we wish that, like the signalman, we could control the operation of our railway by means of levers that enable us to manipulate signals and points.

The new Hornby Control System has been specially devised to enable this desire to be fulfilled.

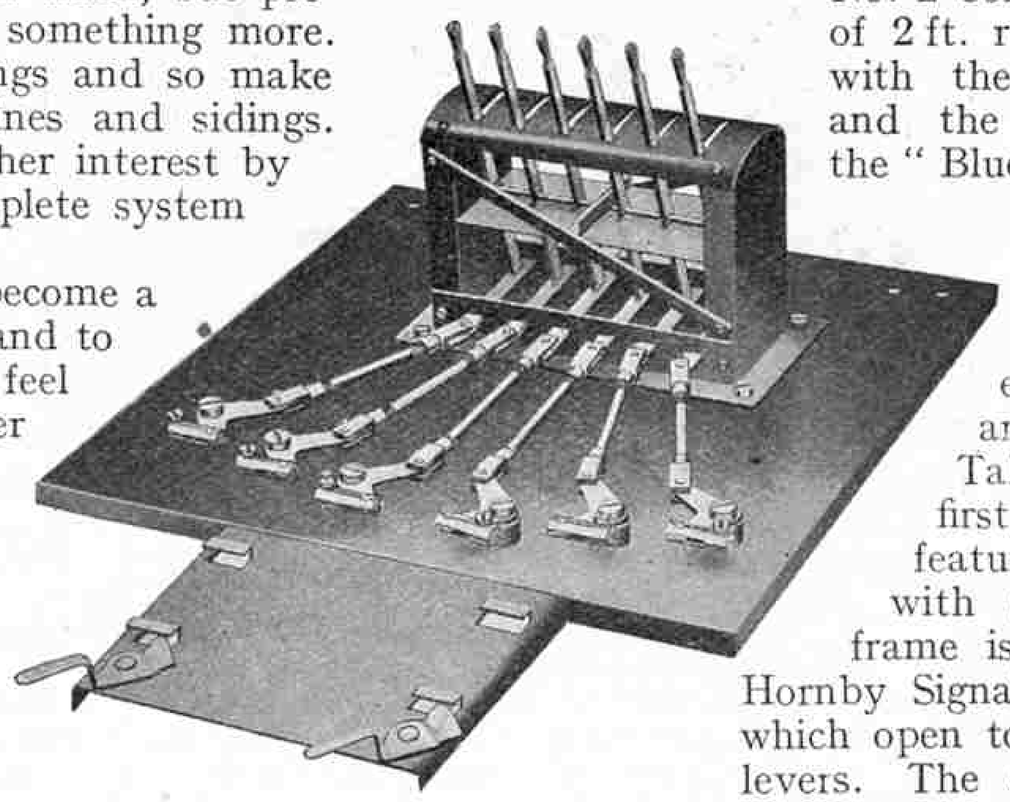


Fig. A. The Lever Frame

Two Different Outfits

The Control System is easy to instal on our Hornby Railway and once it is in operation we are in the position of the signalman whom we previously envied. Instead of being obliged to manipulate individually the points and signals situated at various positions along the track, we are able to control them from one central point, namely, the Signal Cabin. Our railway thus makes a tremendous advance in realism and the possibilities of fun that it now affords are unlimited.

An important feature of the System exists in the fact that any layout in which it is incorporated may easily be dismantled or reassembled.

The special component parts comprised in the Hornby Control System are made up in two different Outfits. The No. 1 Outfit is for use with rails of 1 ft. radius and is intended for operation with "M" series, No. 0 and No. 1 locos and rolling stock. The No. 2 Control Outfit is designed for rails of 2 ft. radius, and is intended for use with the new type of No. 2 locos and the Metropolitan clockwork and the "Blue" Train clockwork locos, which have been adapted specially for the purpose. The addition of one of these Control Outfits to a Hornby Train Set increases enormously the amount of fun and interest that can be obtained.

Taking the No. 1 Control Outfit first, we have as its most important feature a Lever Frame provided with six Levers (Fig. A). This frame is specially designed to fit the Hornby Signal Cabin, the roof and sides of which open to permit of easy access to the levers. The cabin is secured to the base of the Lever Frame by means of four nuts and bolts, and the realistic appearance of the complete unit will be appreciated from Fig. C. The hinged back of the cabin has been lowered in this illustration.

Operations Controlled from Signal Cabin

The Lever Frame forms the central point controlling the operation of the whole system, and its position depends upon the nature of the layout. The best fun is to be obtained of course by placing the frame alongside a station as in real railway practice. It is then a simple matter to carry out a variety of operations in a most fascinating manner. By manipulating the various levers we can control the signals giving right of entry to or exit from the station. Also we are able to operate two sets of points and thus transfer any train from the main line to a branch line or siding, or *vice versa*, just whenever we choose.

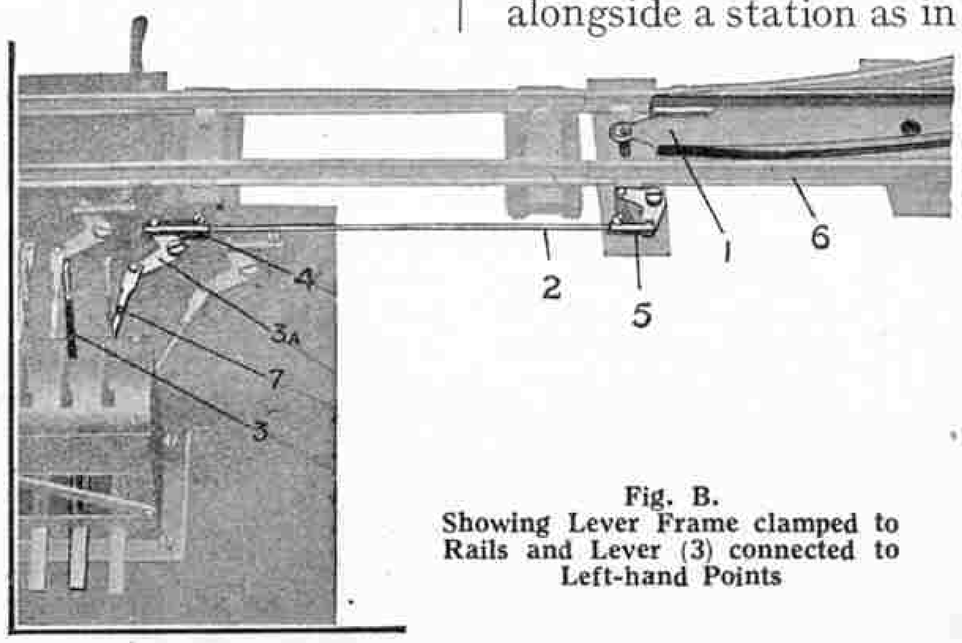


Fig. B.
Showing Lever Frame clamped to Rails and Lever (3) connected to Left-hand Points

All these operations are controlled entirely from the Signal

Cabin without any necessity to touch the signals or points at all.

Locos Controlled Automatically

The interest and excitement are increased still further by the use of the Brake and Reverse Rail, included in the Outfit. This rail enables us, by operating the particular lever in the cabin, to stop " M " series, No. 0 and No. 1 Locos, or allow them to go through, at will, according to whether the signal ahead is at " Danger " or "All right." The above-mentioned locos are stopped by placing the lever so that the brake projection is in a central position midway between the rails, and in order to start them again it is necessary to move the projection to one side or the other and manipulate the brake lever in the cab of the loco.

The remaining contents of the No. 1 Control Outfit consist of two special Control Signals, two Control Points, two Rodding Compensators, Wire, Guide Brackets, and other accessories.

With one important exception the No. 2 Control Outfit contains the same components as the No. 1, but the points are of 2 ft. radius. The exception referred to is the substitution of a Control Rail for the Brake and Reverse Rail of the No. 1 Outfit. This Control Rail has been designed for use with the improved mechanism of the special No. 2 Loco and the Metropolitan Clockwork and " Blue " Train Clockwork Locos, and it places in our hands an entirely new power. By means of it we are able to reverse the loco, and not only to stop it whenever we wish but also to start it again automatically without touching either the track or the lever in the loco cab. The Control Rail may be used for braking or reversing the ordinary No. 2 Loco, but after braking, this loco cannot be started automatically but must be re-started by the brake lever in the cab.

The Control Rail adds remarkable realism to station operations and it completes our control of the whole layout.

Installing the Control System

We now come to the actual installation of the Hornby Control System.

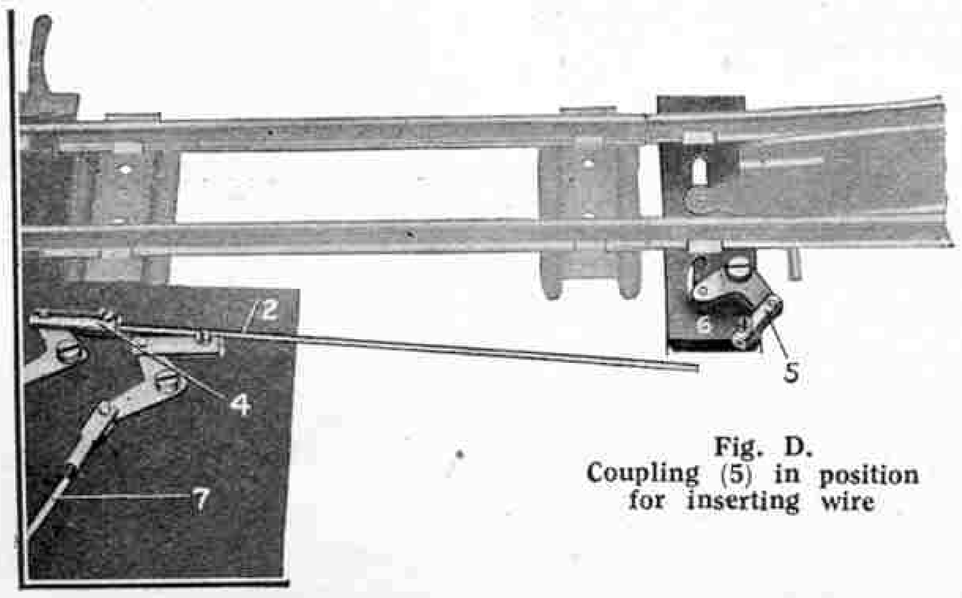


Fig. D.
Coupling (5) in position for inserting wire

When a layout has been decided upon, the Lever Frame is clamped to the rails at a convenient point, as shown in Fig. B, by means of the clamping levers and small lugs in the front portion of the base (Fig. A). This frame now becomes the central control point of the layout and it should be housed in a Hornby Signal Cabin.

In Fig. B. we show Left-hand Points (1) connected by a Rod (2) to a Coupling (4) on the Lever Frame. In this illustration the points are shown close to the Lever Frame. This has been done solely for convenience of illustration, however, and the principle of attachment will be the same wherever the points are fixed. It should be noted that this applies to Left-hand Points operated on the right of the Lever Frame, or to Right-hand Points operated on the left of the Frame.

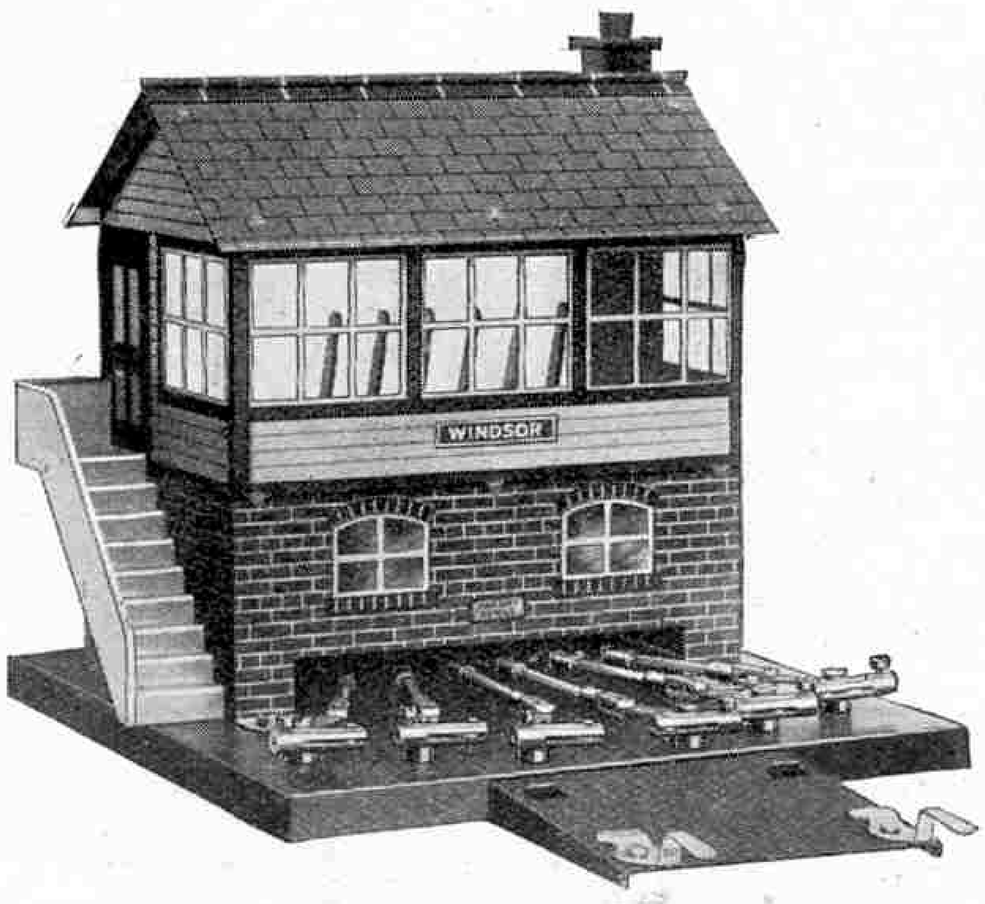


Fig. C. Hornby Signal Cabin, with Levers in position

Attaching the Wire Rodding

In order to attach the wire Rodding, a piece of wire is cut long enough to be connected by the Couplings (4) and (5) Fig. B, when the Lever (3) is in its normal position, the Points (1) being in the position shown. The wire is then connected by means of the pinching screw to the Coupling (4) and the Points are drawn over to the near side rail (6), which movement draws back the Coupling (5) into the position shown (5) in Fig. D. The end of the wire (2) is then inserted in the Coupling (5) and secured by the screw. When this operation is completed the Points will be in the position shown in Fig. B.

When the Lever (3) is pulled over, a thrust is given to Coupling (4) and Coupling (5), thus moving the Points (1) from the straight to the curve.

A Connecting Rod (7) Fig. B, having a right and left thread is connected to each lever in the frame, thus enabling a fine adjustment to be made. The great value of this Rod lies in the fact that, after we have coupled up our wire Rodding, we can adjust matters so that when the lever is pulled on or off any points to which it may be connected are moved fully to one side or the other. Thus the movable tongues are pressed closely to the rail, ensuring that the trains will travel smoothly over the points.

If it is found that, after cutting and fixing a wire from the lever frame to a signal or points, the length is a fraction of an inch too short, the wire may be lengthened slightly by cutting it again at some point and there introducing a coupling.

Fig. E shows the type of cutting pliers that we consider best for cutting the wire for the Control System. A pair of these pliers is enclosed in every Control Outfit.

The concluding instalment of this article, which will appear next month, will include illustrations and further particulars of the Control Rail and the Brake and Reverse Rail, and will contain additional instructions.



Fig. E.

FROM OUR READERS

These pages are reserved for articles from our readers. Contributions not exceeding 500 *words in length are invited on any subject of general interest. These should be written neatly on one side of the paper only, and they may be accompanied by photographs or sketches for use as illustrations. Articles that are published will be paid for at our usual rates. Statements contained in articles submitted for these pages are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.*

Cranes for Fuller's Earth Pits

The accompanying illustration shows the smallest of three large cranes installed in the Fuller's Earth Pits near Redhill, Surrey. These cranes were built by Stothert & Pitt Ltd. of Bath, and their work is of rather an unusual nature. The Fuller's earth exists in the ground in layers down to a depth of as much as 60 ft. These layers have to be uncovered and the cranes move the excavated earth from one side of the pit to the other. The excavations may reach a depth of 20 ft. below the crane track, and after the Fuller's earth has been removed, the ground is again made up to the level of the track, which is transferred so that the crane is running on made-up ground. Hence it is very important that the wheel pressures should be distributed as evenly as possible.

The largest of the three cranes has a lifting capacity of 3½ tons at any radius between 45 ft. and 110 ft. at 200 ft. per minute, and the load can be luffed at 120 ft. per minute. It is fitted with the "Stothert & Pitt" horizontal luffing gear which, with the aid of a moving ballast box at the back of the crane, balances the jib and load in all positions. When the crane was originally tested the luffing gear pinion was taken out of gear completely. The luffing barrel then remained motionless, proving the accuracy of the balance.

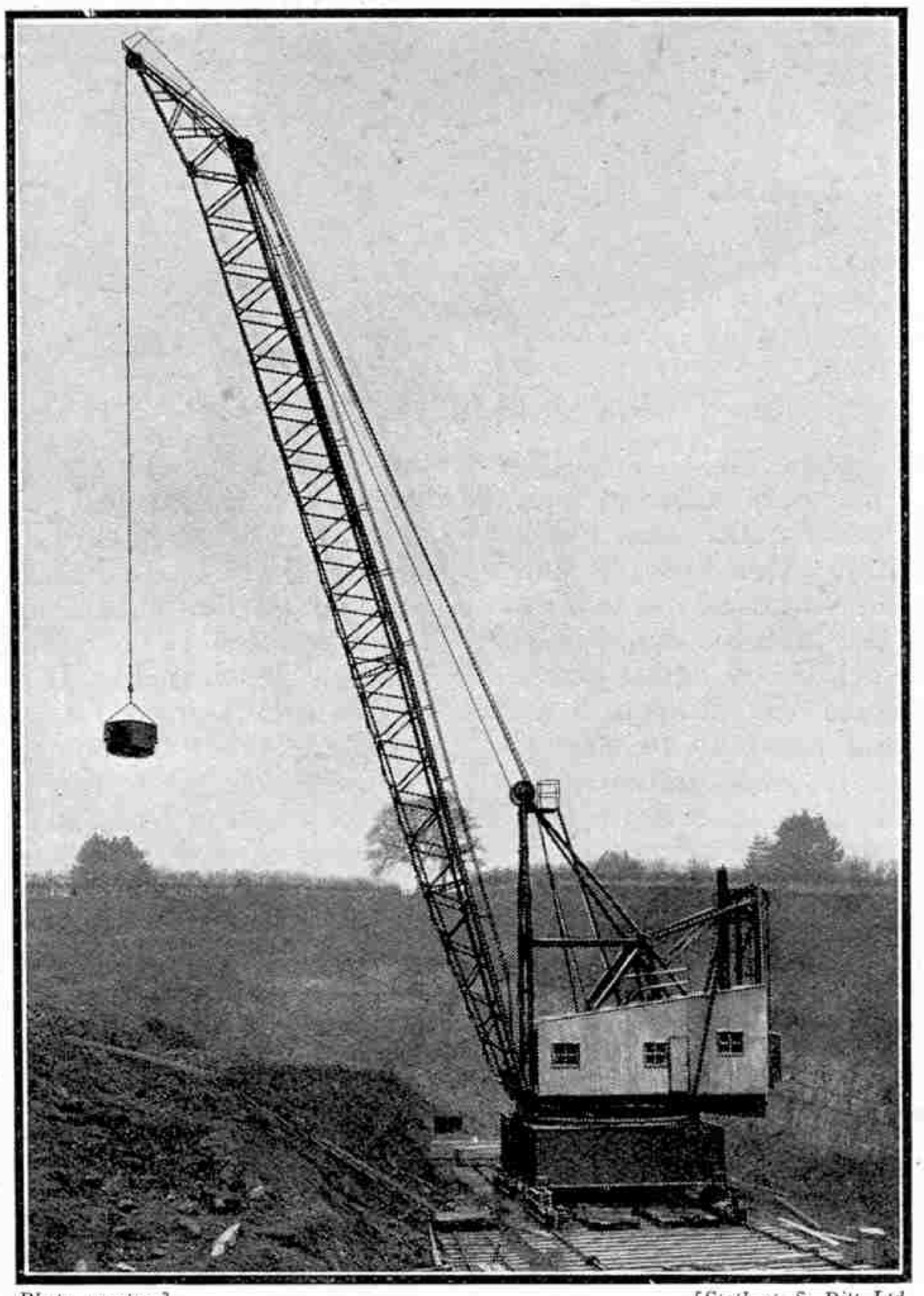


Photo courtesy] [*Stothert & Pitt Ltd.*

Crane at Fuller's Earth Pits

The motions of lifting, luffing and travelling are operated by a pair of horizontal engines with cylinders of 10 in. diameter and 14 in. stroke, the travelling speed being 150 ft. per minute. Steam is generated by means of an oil-fired "Spencer-Hopwood" water-tube boiler and the steam is superheated. Swivelling is effected by a separate set of engines, 7 in. diameter and 10 in. stroke, which drive, by means of spur and bevel gearing, a steel pinion that engages with a pin rack fitted on the top of the track. The truck is made very rigid by means of steel plated sides and in order to distribute the load each corner is provided with two 4-wheeled bogies so arranged that all wheels at one corner of the truck carry equal loads.

L. F. DURMAN (Caterham School, Surrey).

A Visit to Lowestoft Fish Docks

"Hey there!" cried a rough voice, and a handcart bumped me from behind. I promptly dodged, but another cart caught me and yet another. I was just thinking that I should be crushed between them when a strong hand grasped my shoulder and hauled me into safety. This was my introduction to the fish docks at Lowestoft.

My rescuer, a bronzed, powerfully built fisherman, grinned cheerfully at me. "Near shave that, miss!" he said. "They're much too busy to be polite," he added, "but just stand here and you will be out of the way."

From my place of safety I watched the crowd, which included strapping young fishermen, clad in blue jerseys and heavy sea boots or wearing coarse brown smocks reaching to their knees, and queer old men who might have stepped from one of the stories of W. W. Jacobs, with tufts of beard bristling on their chins or surrounding their faces from ear to ear! Some lounged about, smoking and chatting, while others were busy unloading, salting and packing fish. Boys raced along handling heavy carts with marvellous ease, sometimes stopping suddenly and then darting forward again, throwing their whole weight into the manœuvring of their carts through apparently impossibly small spaces.

A smack was unloading its catch. Baskets of fish were lifted through the hold and deftly swung on to the quay by means of a long iron hook. There the fish were sorted at lightning speed and packed into boxes or barrels ready to be sold by auction. The auctioneer, resplendent in a coat of spotless white and surrounded by a crowd of

buyers, clerks, and loungers, took one barrel at a time, gave a brief description of its contents, and then the bidding started.

"Thirty-four," snapped the auctioneer. "Thirty-four, thirty-four, thirty-four, thirty-five, thirty-five and six, and six, thirty-seven, thirty-eight, going at thirty-eight, thirty-eight, Gone!" He fired all this off without appearing to stop to breathe, his mouth opening and shutting with the speed and precision of a machine gun. On the other hand I never saw the buyers open their mouths and I concluded that they must have made all their bids by nods or winks!

Pangs of hunger drew me away from this fascinating spot, but I hope some day to visit it again and learn a little more of the mysteries of handling "the harvest of the sea."

Miss M. WATSON (Batley).

New Bridge at Berwick

In February 1925, work was commenced on a new bridge at Berwick, and it is estimated it will take two-and-a-half years to complete the job. The bridge, which will be the first of its kind in Great Britain, is of four spans, the first of 248 ft. and the second over 300 ft.

The method of construction is very interesting since the concrete is brought by boat to the Tweed Dock, from whence it is carted to a shed. Here it is emptied into mixers and is mixed with other materials; then it is conveyed to the cranes, which lift it on to the top of moulds into which it is emptied to set. The concrete is left in these wooden moulds for a couple of days in order to thoroughly harden.

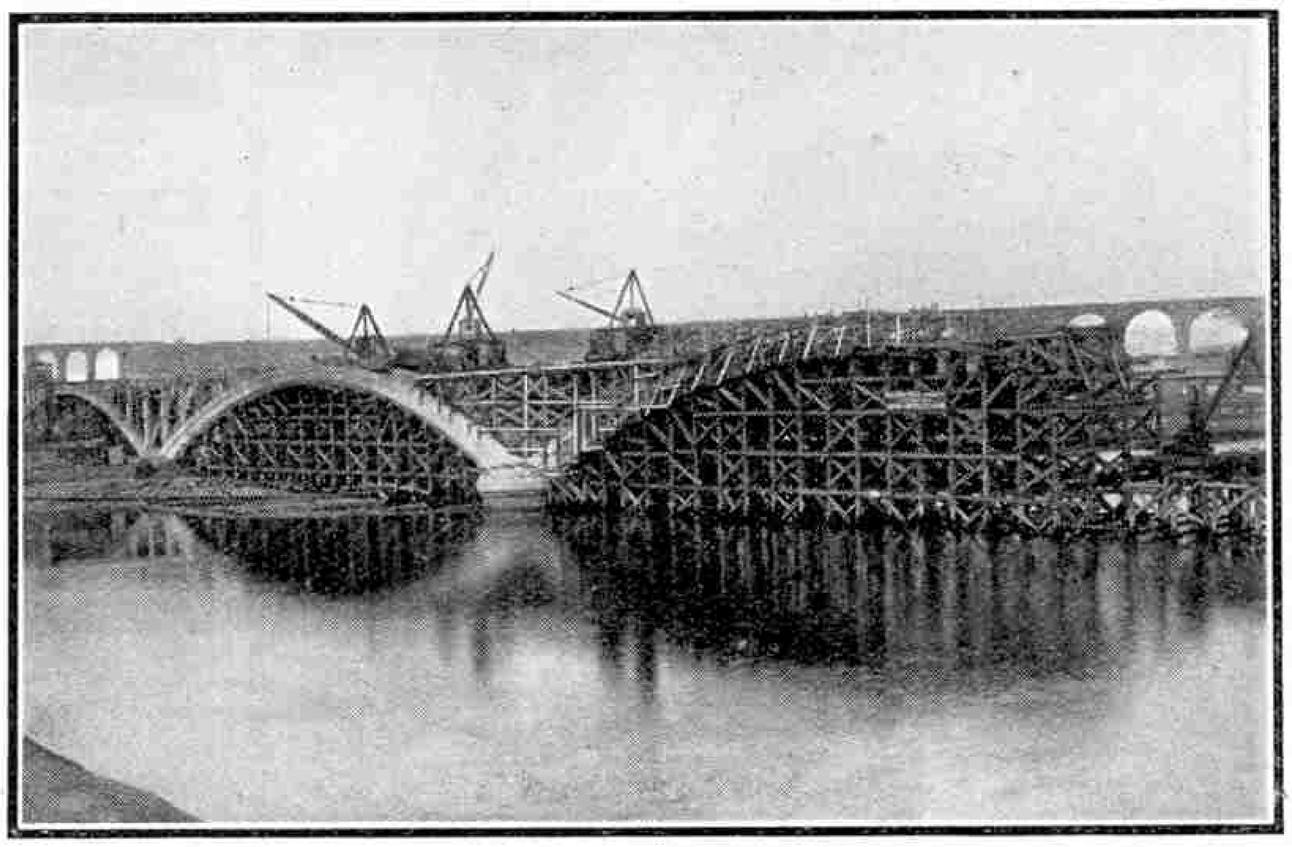
Whilst the first lot of blocks are in the drying and hardening stage, fresh moulds are being filled, until the required number of blocks are ready between each span. When they are ready, all the framework is removed from under the span, which gives a clear view of the construction of the coffer dam, a most important and indispensable part of the structure. Work on the coffer dam having been completed, operations proceeded further across the river where work has been commenced on the third span.

Silver sand has proved a great barrier to the progress of the work, piles having been driven in and lost in the sand. This difficulty has now been overcome by driving in a number of concrete piles, the top of which have been cut off by means of hydro-oxygen. These piles are brought to the top, then lowered down near the coffer dam. The work of pile driving and work on the third span is now in progress and is a source of constant interest to crowds of onlookers, work on this span being almost complete except for the coffer dam. The engineers have already commenced to build the last dam, and are working towards the middle of the river.

GEORGE PURVES (Tweedmouth).

Lochaber Water Power Scheme

While on holiday this year at Corpach, near Fort William, Scotland, I and a friend had the interesting experience of visiting the Lochaber Water Power Scheme. It is a scheme of the British Aluminium Corporation and is being carried out by Balfour Beatty & Co. to collect water from Loch Trieg and other sources by a subterranean tunnel. The water goes to a Power Station, which will provide power for the British Aluminium Corporation works and others to be built near to it.



The New Bridge at Berwick-on-Tweed

One of the engineers in charge of the station, took us both over part of the work one afternoon. First we motored to the headquarters near Fort William, where there is a 3 ft. gauge light railway running the whole length of the work—there are 24 miles of this line in all. Our mode of progress round the works was novel, since we travelled on an old Ford car fitted to run on the railway lines.

The working of the tunnel consists of ten shafts sunk into the rock and from the bottom of each a tunnel is worked in both directions until the workings at the bottom of each shaft meet and form the main tunnel. The tunnel is 16 ft. in diameter and 15 miles in length, being built with a slope from one end to the other. The shafts will be used to divert streams into the tunnel.

At the top of each shaft is a little camp each of which is given a distinctive number. The electric power on the works is derived from a power station on the River Spean, it is 11,000 volts, which is reduced at every camp to 400-volts.

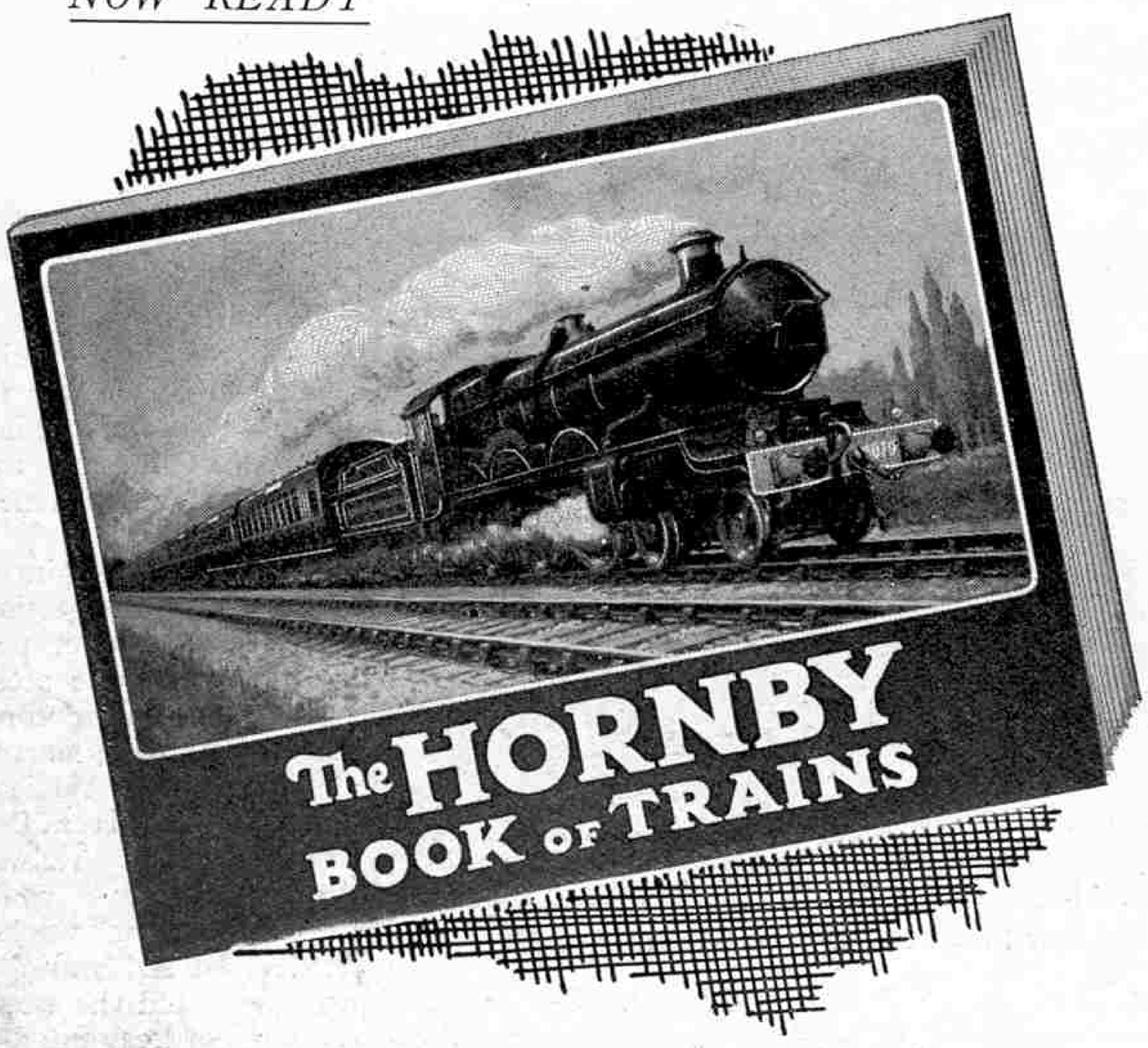
Our first stop was at a delightful little camp about half way along the light railway. Here we saw a machine that compresses the air to drive the drills in the tunnel and also some of the machinery on the camp, such as the machines for sharpening or reshaping the bits of the drills. From here we took the car back some distance and entered the tunnel. This shaft was sloping, not being straight down like some of them. We walked down into the tunnel, where we first of all saw the mechanical digger being used to dig away the rock, which had to be blasted. We walked on to the end of the tunnel where they were drilling holes to receive the dynamite, and we were told that most of the men who work at the drill become deaf in time.

Coming up to the surface again we took the car back to the Headquarters and said "Good-bye" to our guide after a day that was about the best day of my holidays in Scotland.

DENIS T. K. DON (Claygate, Surrey).

*(This great engineering achievement, in which considerable progress has already been made, is so interesting that we are arranging for a special article on the subject. This is now being written by one of the engineers engaged in the contract and will appear in an early issue.—*EDITOR).

NOW READY



The 1926 Edition

This year we have produced an entirely new edition of the Hornby Book of Trains and we want every reader of the "*Meccano Magazine*" to obtain a copy, either direct from us or from his dealer. Order now as the supply is limited.

The book, which is now ready, is beautifully printed on art paper and contains 48 pages (11″×8¼″). A splendid reproduction of the "Cornish Riviera Express" at speed is printed on the cover.

It will be remembered that last year we devoted the first half of the book to the story of the locomotive from its earliest days. This year the same amount of space is occupied by a detailed description of the locomotive and the principal railway mechanisms.

The following are the chief subjects dealt with :—

THE BOILER AND ITS PARTS.
HOW THE ENGINE WORKS.
HOW AND WHY STEAM IS SUPERHEATED.
RAILWAY BRAKES.
THE STORY OF BRADSHAW'S RAILWAY GUIDE.
HOW TRAINS ARE LIGHTED AND HEATED.
SIGNALS AND SIGNALLING.

FULL PARTICULARS OF THE NEW HORNBY TRAINS

The second half of the book is again devoted to a beautifully illustrated description of all the Hornby Trains and the latest additions to the Hornby Series of Rolling Stock and Accessories. The illustrations are printed in four colours and the reproduction of the Hornby Trains is most realistic.

HOW TO ORDER THE BOOK

Address your orders to "Hornby Book," Meccano Limited, Binns Road, Liverpool, and please write your name and address clearly.

The price of the book is 3d. (post free), and a remittance for this amount should be sent in stamps. There is no reduction if more than one copy is ordered. Orders will not be acknowledged but will be executed in the rotation received.

ORDERS FROM OVERSEAS

There is a special edition of "*The Hornby Book of Trains*" for Overseas readers. Readers overseas who require copies should address their orders to the agency in their own particular country, listed in the next column.

Readers living in countries other than those mentioned should order from Meccano Ltd., Binns Road, Liverpool, and send a postal order for 6d. with their order.

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SOUTH AFRICA. Arthur E. Harris (P.O. Box 1199), Textile House, Von Brandis Street, Johannesburg.

Order your copy now!

OUR MAIL BAG



In this column the Editor replies to letters from his readers, from whom he is always pleased to hear. He receives hundreds of letters each day, but only those that deal with matters of general interest can be dealt with here.

Correspondents will help the Editor if they will write neatly in ink and on one side of the paper only.

Kenichi Yoshida (Tokyo, Japan).—"I must tell you of my ambition. I am going to establish a regular communication of Airships from Japan to America, America to Europe, in other words round the world. Try to live to a green old age and you might have a free ride in one of these aerial monsters." Splendid, Kenichi! We shall certainly make a superhuman effort to live on for years and years, but we must beg to be excused from turning green, as suggested. You probably meant to write "ripe!"

L. Hall (Manchester).—"For three years I have been a Wesleyan local preacher and your issues have furnished me with any amount of children's addresses." We are gratified to know that the Magazine has helped such a worthy cause, and wish you continued success in your good work.

N. G. Holmes (South Africa).—"If I were Jackie Coogan I would not want to be an engineer, because I would earn a living by acting for the films." If we could do it as successfully as Jackie, N.G., we think a film career would claim our future attention also. Excuse us a minute while we go and practice "registering" expressions before the office mirror!

Noel Jones (Wrexham).—"During the holidays I dug up a German halfpenny and a hand-grenade." Do be careful, Noel! We had some experience with hand-grenades ourselves, ten years ago, and they are most unpleasant bed-fellows! We note that in the village shop they give a sheet of transfers with every halfpenny sherbet. We are not surprised that the supply was soon exhausted—it would have given out even earlier if we lived in Wrexham!

R. Boothby (Southgate, N.S.W.)—You must be a very close follower of cricket form to have been able to pick the Test team beforehand with only two mistakes. Your team is giving a good account of itself here already, and all the members are very popular amongst our sportsmen. We appreciate your kind remarks on the "*M.M.*"

F. G. Barham (Pretoria, S.A.)—The reading of your great-grandfather's book "The Ingoldsby Legends" forms one of our earliest and happiest recollections. A little while ago we dipped into it again, and read "The Jackdaw of Rheims," "Adventures in Margate," and the story which begins "Oh! he won't, won't he? Then bring me my boots," with renewed delight.

C. C. Redfern (Cobham).—"We have been rather sceptical about the educational advantages of those strips of metal bolted together to make a model. Butler and Redfern have converted us. Butler's loom is the best piece of work ever seen in the School, and Redfern's High Speed Ship Coaler was also excellent." We have quoted the extract from your School Magazine on your Hobbies Exhibition in full because we consider it a tribute not only to Meccano, but to the fine work of yourself and your friend Butler.

F. Meroni (Lake Maggiore).—It pleases us to hear of the boys building Meccano models on the shores of your beautiful lake. We have sailed the lake in glorious sunshine, and that is how we always like to remember it.

D. R. Nyss (Bwodman, India).—Many thanks for the photos of loco used on the East India Railway. We have few finer locos even in this country. By the way Mr. Hornby will be travelling in India next spring and we are hoping to publish some of his experiences there a little later in the "*M.M.*"

V. M. Armstrong (Reading).—You do not state exactly what the trouble is in your three-speed gear. If you will let us have full details we shall be pleased to try and help you.

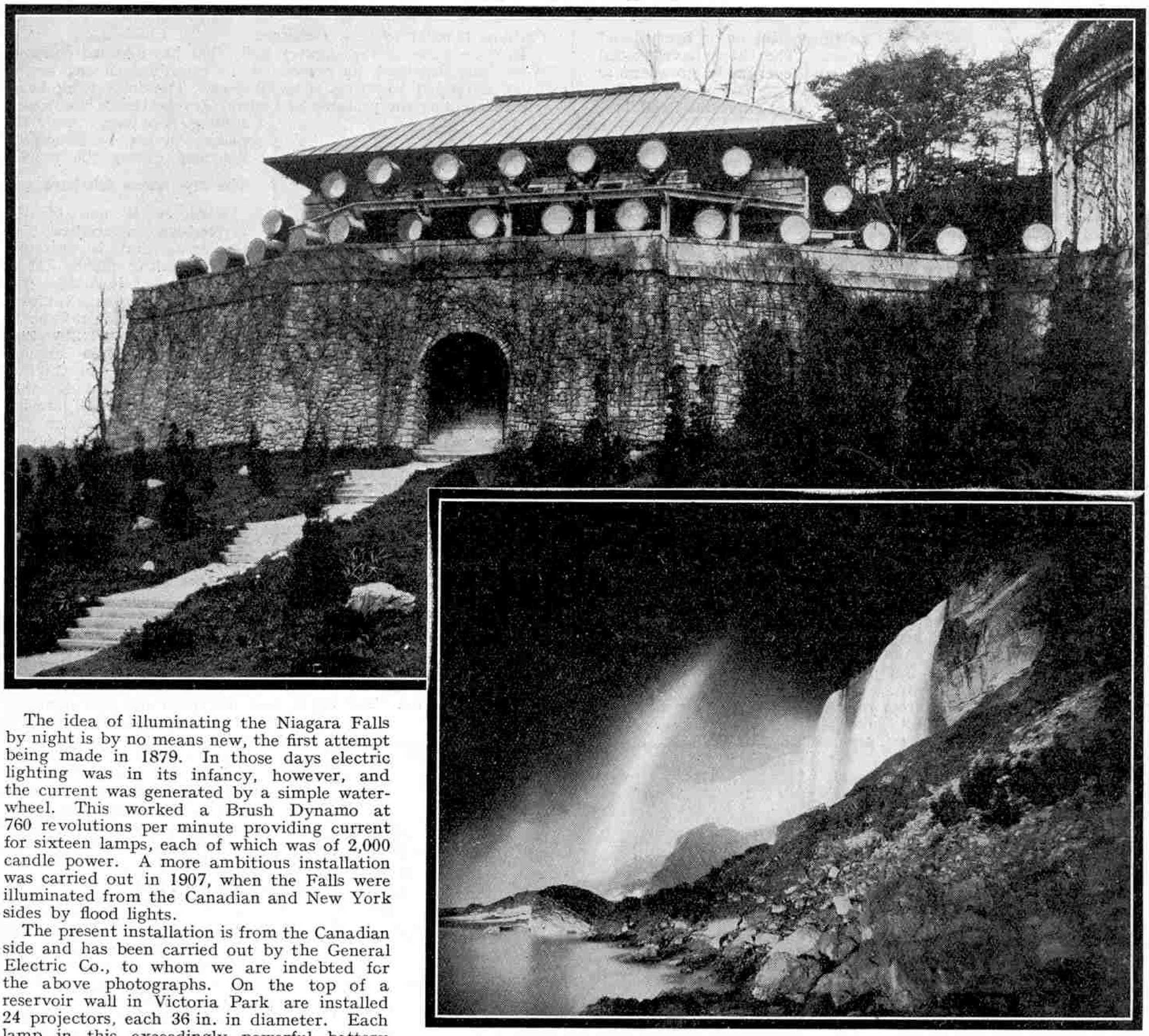
R. Taylor (Oldham).—We are pleased to learn that your school teachers have found the "*M.M.*" so interesting and useful. We hope they will help you in the formation of your Club. We have posted booklets to you separately.

J. Byrne (Wyreema, Queensland).—We can quite understand you being able to "hear a station 9 miles away" on your Meccano Crystal Set but how you come to hear a Melbourne station 1,000 miles away is a mystery. Even though Melbourne is broadcasting at 5,000 watts and you are 2,000 ft. above sea level the performance of the set is surprising.

W. O. Hodder (Goffs Oak).—"To my mind the great feature of Meccano models is that they do their job and work correctly." That, W.O.H., is why the Meccano star, after shining so brilliantly for 25 years, is still the brightest star in the boys' firmament.

Illuminating the Niagara Falls

Battery of 36in. Searchlights give over a Billion c.p.



The Niagara Falls by night, showing "Rainbow" effects in the column of spray

(Above) The Battery of Searchlights mounted on the wall of an old reservoir

The idea of illuminating the Niagara Falls by night is by no means new, the first attempt being made in 1879. In those days electric lighting was in its infancy, however, and the current was generated by a simple water-wheel. This worked a Brush Dynamo at 760 revolutions per minute providing current for sixteen lamps, each of which was of 2,000 candle power. A more ambitious installation was carried out in 1907, when the Falls were illuminated from the Canadian and New York sides by flood lights.

The present installation is from the Canadian side and has been carried out by the General Electric Co., to whom we are indebted for the above photographs. On the top of a reservoir wall in Victoria Park are installed 24 projectors, each 36 in. in diameter. Each lamp in this exceedingly powerful battery gives a beam of 1,444,000 candle-power, the total candle-power thus amounting to the stupendous total of one and one-third billions. As may be imagined, the heat generated is terrific and motor-driven ventilators are installed to dissipate it.

When illuminated with a white light the Falls resemble an ocean of milk, but even more wonderful results are obtained by interposing screens of different colours. The beautiful effects may be imagined when screens of red, orange, green, blue and violet are used.

The lamps are mounted so that their beams may be directed on one or all of the three Falls—The American, Centre or Horse-shoe Falls, and when darkness falls, the mighty cataract is transformed into cascades of liquid colour and in the spray rising from the Falls, beautiful "rainbows" are formed.

For four hours each night the Falls are flooded with white light, the colour screens being used only on special occasions, such as national holidays and birthday anniversaries of famous persons.

The present installation is so designed that only one man is required to operate the whole battery of lights, although on special occasions an assistant is employed. The arrangement of the lights is such that the beams penetrate the fine mists that always rise around the cataract, reaching the main body of the falling water. They also illuminate the great column of spray to such an extent that it is said to be visible at a distance of over 75 miles.

Holly and Mistletoe

Christmas Customs Handed Down from Prehistoric Times

By W. Coles-Finch

SIGNS of the approach of Christmas meet us on every hand during the weeks of December. The shops have special displays of presents and toys, and everybody grows more cheerful as the Festive day approaches.

Perhaps the real spirit of all these things expresses itself best in the decorations with which our homes and the shops are filled. For days before Christmas, loads of holly and mistletoe follow each other in quick succession into our towns and are distributed to eager buyers, who would almost sooner allow Christmas to pass without the traditional cake or pudding than be without the bright green holly or the even more important mistletoe.

The use of these evergreens at this time of the year goes back to almost prehistoric times and is an expression of a feeling common to people of all nations.

When the Sun Turns Back

What thoughts are aroused by the sight of these plants! Older people pretend to be a little sad at the passing of time, but in reality they are remembering the jolly days they had long ago. Younger people are thinking of the games they will have when the day arrives, and they are well acquainted with at least one traditional use of the mistletoe! The children are frankly thinking of presents and good things to eat. But one and all, if they but knew it, are in reality looking forward, as their forefathers did, to the day when the sun turns back from its southern limit, when the days begin to grow longer and lighter, and when the promise of Spring takes more definite shape.

Such hopes and longings could not be expressed better than by decorating our homes with green plants, and in Britain for this purpose we use mistletoe and holly. It would be difficult to imagine plants more suitable, the one with its mysterious-looking white fruits and the other with its glossy green leaves and bright red berries.

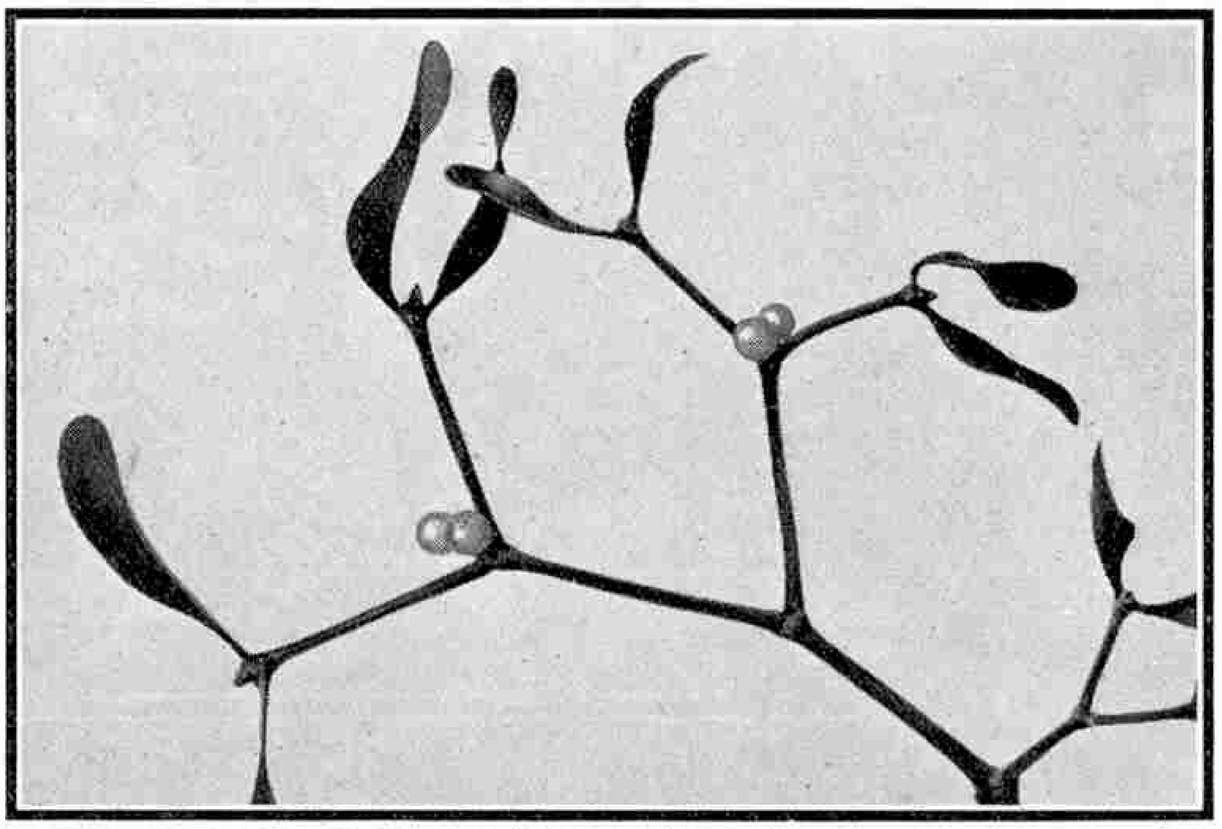
Holly a True Christmas Tree

A holly tree laden with berries is a splendid sight. Last year it was also a rare sight, but there are signs that this year will be a good one and that Christmas will look itself again.

The holly is a true Christmas tree, for its name is certainly a corruption of the word "holy," because it is supposed to have formed the wood of the Cross. It is common to most parts of Britain, and is very rarely injured by even the keenest frosts. Its yield of berries does not often fail completely, but it is usually small when the previous winter has been wet and a warm spring has followed.

The practice of using holly as a decoration at a Christian festival is founded upon its use at old pagan feasts, and is due to a wise decision of the early Christians to Christianise the old heathen customs familiar to their converts.

In some parts of the country holly that has adorned churches is specially cherished, the possession of a small branch with berries being supposed to bring a lucky year. The interesting belief prevails among the peasants of Central Europe that a house containing such twigs from the plant will not be struck by lightning during the year

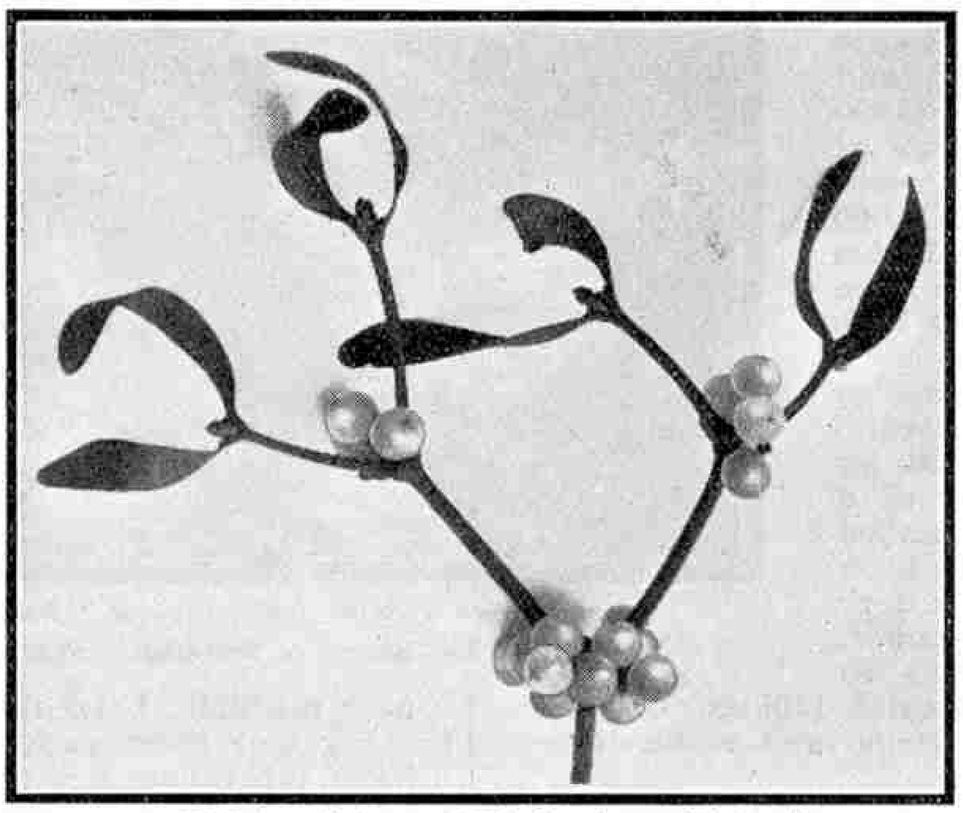


Mistletoe, Christmas 1924, showing the small number of berries

The Mysterious Mistletoe

Mistletoe is one of the mysterious associations of Christmas and is certainly an interesting plant. It is a parasite, but unlike the few parasitic plants common to Great Britain it is evergreen, showing its vivid yellowish green both in summer and winter. From this we may safely conclude that it is not solely a parasitic plant, and in fact it can be grown in pots. Contrary to the general belief, it is rarely found on the oak. In the Middle Ages a large tree in Derbyshire was renowned throughout Great Britain as the only oak with mistletoe on it, and at the present day it is doubtful if there are more than half-a-dozen such trees.

The plant grows best on apple, lime, hawthorn and maple trees. I have also heard of its being gathered from mountain ash, almond, poplar, larch, beech, chestnut and willow. I have seen it growing high up upon the thorn acacia, and have gathered it in an old monastery garden from an espalier apple, growing near the ground. The apple and hawthorn are the favourite hosts of this parasitic plant and our supply is derived almost entirely from the orchards and hedgerows of Normandy and Brittany. The white, transparent, glutinous berries are a favourite with some birds, the thrush, fieldfare, blackbird and redwing being especially partial to them.



Mistletoe, Christmas 1925, showing prolific berries

Cultivating the Plant

The mistletoe can be cultivated. After the plant has fulfilled its interesting and arduous duties of Christmas, keep it in a cool place for the berries to mature. In April, when the sap rises, make an incision on the underside of the branch of a tree, squeeze in the seed and some of the glutinous matter that surrounds it, but not the skin; then await the result of your labours. During the first year little growth is made. In the next year one or two branches are produced and each shoot then doubles itself annually. When the plant is established there is likely to be mistletoe as long as the tree lives, or rather until the branch upon which the mistletoe grows has been killed by the parasite.

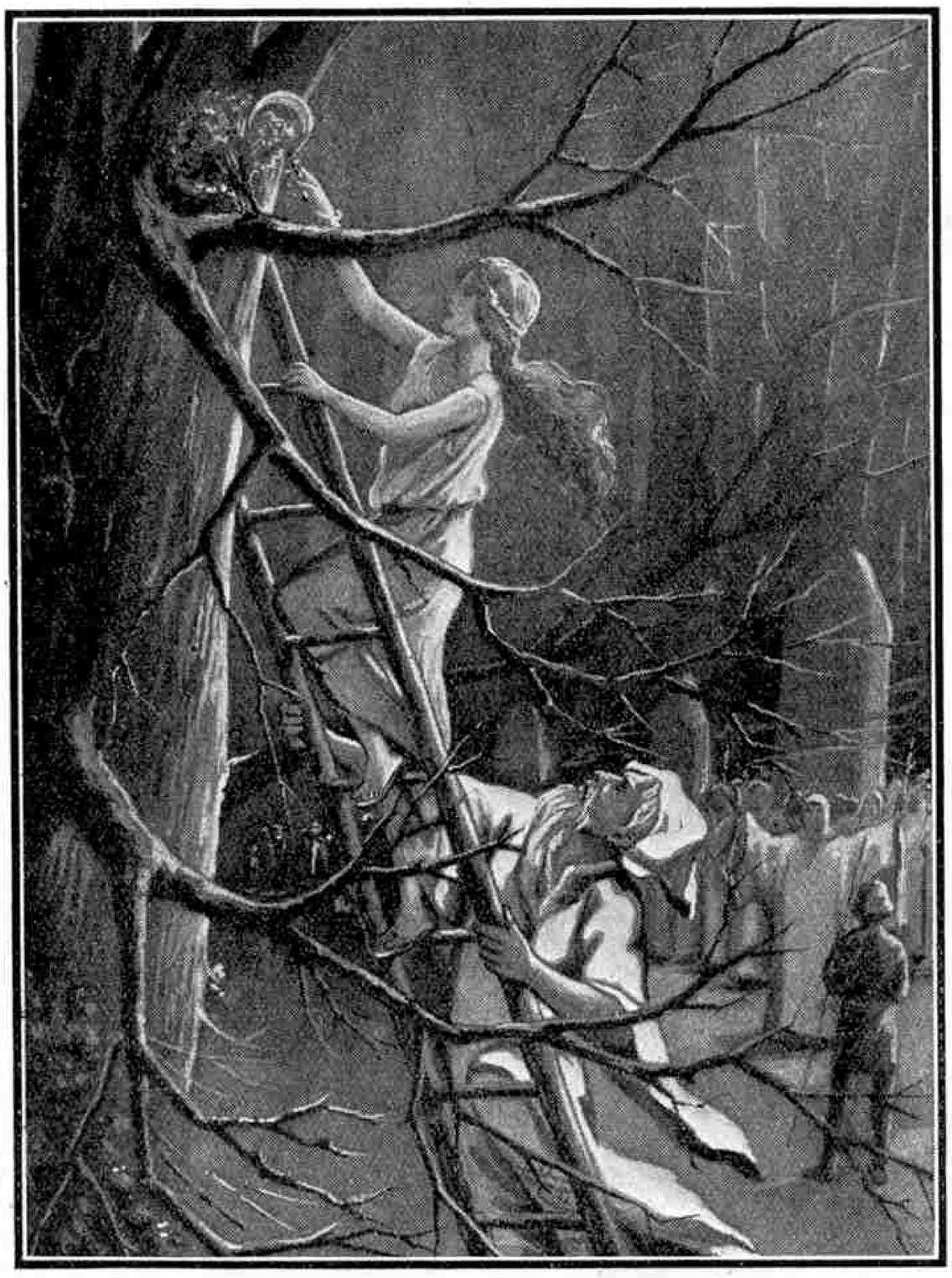
Mistletoe is said to possess the longest history of all our native plants and there is certainly no decline in the veneration with which it has been held for centuries. At the birth of Balder the Good, the Sun-god of the Norsemen, his mother extracted

a promise from all plants and animals not to hurt him. Unfortunately, the mistletoe was overlooked, and it was by an arrow made from this plant that Balder was killed.

Druids and their Oak Groves

In British legend we first find mistletoe in connection with the Druids, who called the plant "Pen awyr" or Heavenly Plant, believing it descended from above, as it would not grow on the earth. The Druids held their sacred ceremonies in oak groves and, let it be whispered, they took care to have mistletoe growing on the oaks in the sacred groves by secretly transplanting it from its more natural host, the apple!

At the time of the winter solstice, when the sun once more turns north, the mistletoe was collected with great ceremony. A grand procession was formed headed by the bards, followed by the herald with a golden knife or sickle, the priests clothed in white, the Prince of Druids, and finally the common people. Two white bulls were bound to the tree, and then the Prince climbed up and cut the mistletoe, which he dropped into the hands of the Druids beneath. After the sacrifice of the bulls, the mistletoe was distributed among the people, who hung it up over the entrances to their houses in the belief that this would be pleasing to the spirits that control the frost and cold weather.

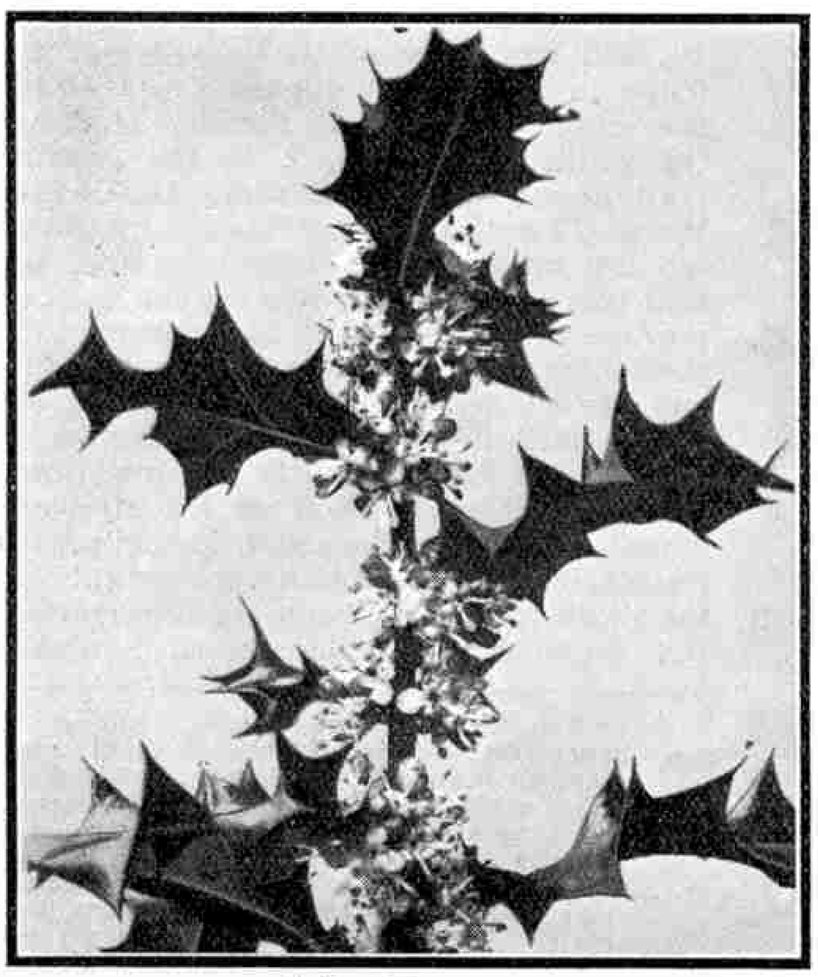


The Ceremony of Cutting the Mistletoe was performed either by the Prince of the Druids or by a specially chosen Maiden

As already mentioned, the Christian Church adopted pagan dates and customs, transforming them into Christian feasts, and so the use of mistletoe also passed into Medieval times.

The Mistletoe Game!

Mistletoe has always been used at Christmas in kissing games, and there is an old tradition that the maid who passed her Christmastide without being kissed under the mistletoe would not be married for a year! This custom of kissing led to unruly scenes in churches which resulted in the banishment of the plant therefrom during the Middle Ages. It was impossible to banish such a good plant and such a good custom from private houses, however, and they are both flourishing to this day!



Holly: Flower

Many other plants have been used from time to time as Christmas decorations. Of late years in this country the use of the spruce fir Christmas Tree has grown very common, and rightly so, for it combines many associations and traditions of Christmas. It is usually supposed to have been introduced into this country from Germany and Scandinavia, during the last century, the actual person to introduce it being a German maidservant of Queen Caroline, who married our George IV. It is noteworthy, however, that a tree of gold is mentioned as having been set before Henvy VIII. during some Christmas revels.

In the Christmas Tree in its present form we have combined the use of evergreens as Christmas decorations and the custom of present-giving, the present of course being hung on the tree. No Christmas Tree would be complete without lights, and this is a pretty way of associating the custom with the birth of Christ, for here we have the expression of vague traditions of lighted candles at ancient Jewish Feasts, one of which was in progress at the time of the Nativity.

These old-world customs are well worth conserving and it is interesting to note that in days gone by these decorations were allowed to hang until Candlemas Day, 2nd February, the feast day of the Purification of the Virgin Mary, the name being derived from the procession with candles formed on this day. On this day the holly and mistletoe were taken down and replaced by box.

There are many quaint customs and superstitions in connection with this subject, but we have not space to tell them here. We all agree, however, that Christmas decorations are the acknowledged emblems of peace and goodwill.

Times arise when holly and mistletoe are scarce or even unobtainable, yet green decoration we must have. On such occasions we fall back on the use of the familiar laurel; the stately box, dear to lovers of old-world gardens; or rosemary, the fragrant little herb with the pretty green and white leaves, which plays so important a part in folk lore and literature as the emblem of remembrance.

It is a curious fact that practically all these Christmas plants have some part that is poisonous, the berries of holly and mistletoe, for example, and the leaves of the laurel.

At the same time the leaves of the two former have always been highly valued for their healing powers.



Holly: Fruit

A Meccano Demonstration of Hunting Gear

As Applied to Power-Steering of Ships

By H. F. Lane

Mr. Lane's second article deals with a very ingenious device known as "hunting gear," and describes a simple Meccano model that demonstrates the operation of this essential adjunct to the power-operated steering gear of ships. Last month our contributor, who is an authority on nautical subjects, described a helm indicator constructed principally from Meccano parts that has been in use on a certain steamship for some years, and future articles that we anticipate publishing from his pen will deal with emergency steering gear and the Flettner Rudder.

FOR many years past, ships have been of a tonnage, power, and speed that rendered hand-steering no longer feasible. In even a comparatively small vessel nowadays the weight of the rudder may be as much as ten tons, and when "hard over" (35 degrees of helm) this may be required to exert a pressure on the water of anything between one hundred and two hundred tons. It is stipulated by Board of Trade regulations that all merchant ships must be fitted with some means of operating the rudder by hand as an alternative system of control in the event of failure of the power, or other emergency, but the reduction gear that must be used in such a system to overcome the enormous forces involved renders the movement of the rudder so sluggish that, save under the most favourable conditions of wind and sea, the ship becomes very nearly unmanageable.

In vessels of 100 tons and upwards, therefore, some type of power unit controls the movement of the rudder, and in all types of power steering gear a special apparatus must be provided that will cause the rudder to respond to the smallest movements of the steering wheel. The rudder must move only when the quartermaster moves the wheel on the bridge, and must come to rest at whatever position is indicated by the wheel when the rotation of the latter ceases. Moreover, it must remain stationary in that position until the quartermaster again moves the wheel—either to return the rudder to the 'midships' position, or to increase the existing angle of helm.

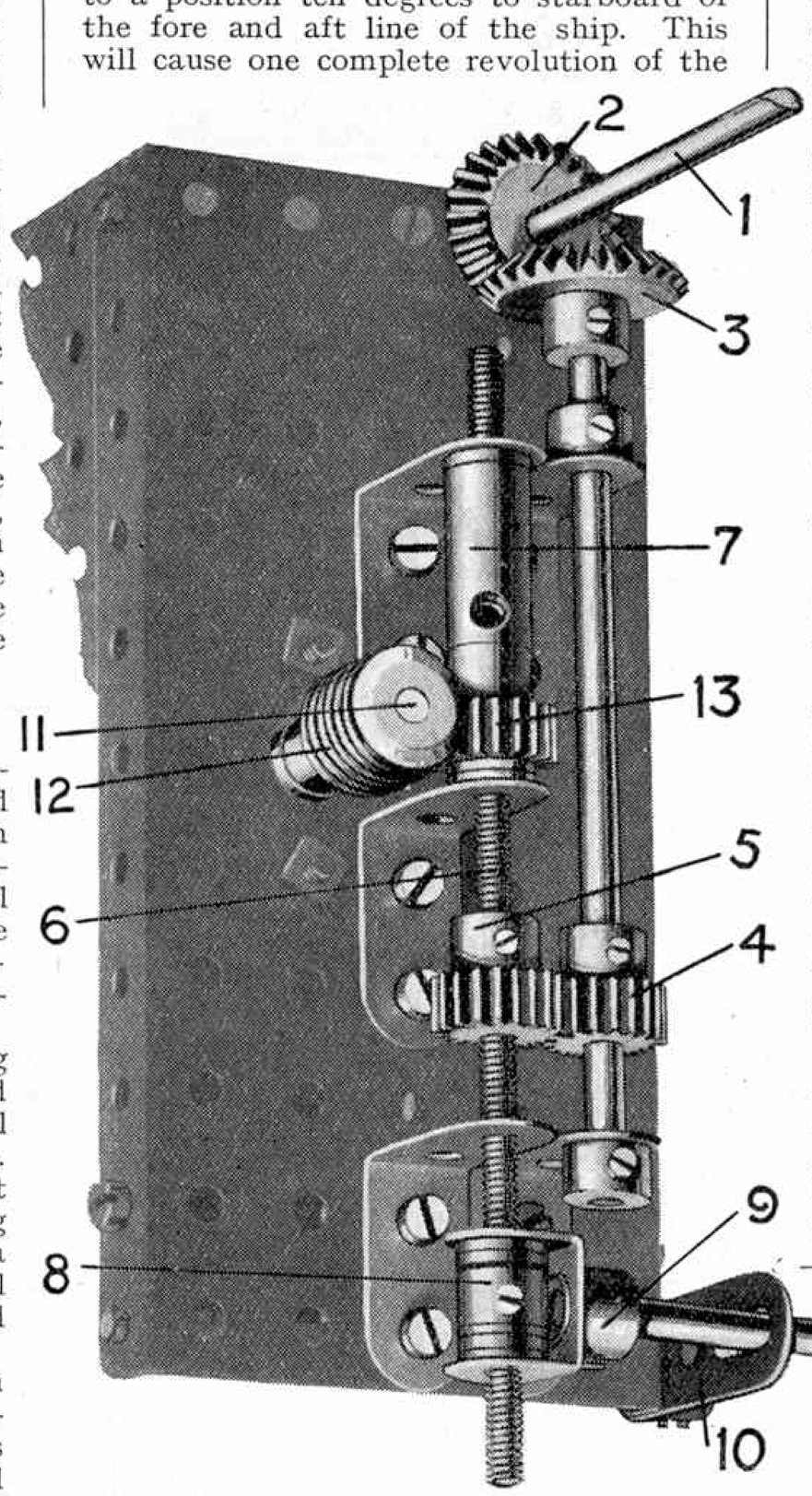
Operation of the Model

The device that fulfils all these requirements is known as "hunting gear," and the operation of this ingenious mechanism should be clearly understood on examination of the Meccano demonstration model illustrated herewith. The Perforated Plate on which the model is mounted represents the exterior of the power unit controlling the rudder.

In actual practice a shaft corresponding to the Rod 1 in the photograph is coupled through suitable bevel gears and universal joints to the steering wheel on the bridge. The helmsman, by moving his wheel, let us say, to the left, communicates a turning movement in a clockwise direction to a Bevel Wheel 2 and, via the second Bevel 3 and Pinions 4 and 5 rotates the Threaded Rod 6.

It will be seen from the illustration that the Threaded Coupling 7, the longitudinal bore of which engages the threads of the Rod 6, is held against longitudinal travel; therefore the Threaded Rod, in turning, descends in the Coupling, carrying with it the Collar 8. The latter is spaced by five Washers in the centre of a Fork-Piece 9, which carries a 1½" Rod engaging the end elongated hole of a Crank 10; hence the descent of the Rod 6 lowers this Crank and imparts a slight rotary movement to the shaft to which it is secured. This shaft operates the valves (or switches, if electrically driven) of the power unit controlling the rudder, and accordingly the rudder commences to move.

Let us suppose the original position of the steering wheel to have been "midships" (with rudder central), and the helmsman to have given the wheel one complete turn to the left, which, in universal practice, requires the helm to come to a position ten degrees to starboard of the fore and aft line of the ship. This will cause one complete revolution of the Threaded Rod, and the Collar 8 will fall a distance equal to the pitch of the Threaded Rod, thereby setting the power unit in motion and commencing to move the rudder.



Hunting Gear illustrated in a practical manner with Meccano

But the motion of the power unit, in addition to operating the rudder, is arranged to revolve also the shaft 11 (in this instance in an anti-clockwise direction seen from the fore side, as in the illustration), and this in turn rotates the Pinion 13 by means of the Worm 12. The Pinion has been soldered to the Coupling 7, so that the two parts revolve as one unit,* and as the Threaded Rod is no longer rotating, assuming the helmsman to be holding his wheel steady at one turn to the left, the revolution of the Coupling 7 causes the Threaded Rod to start to rise again. When the Coupling has rotated to an extent equal to that which the Threaded Rod turned originally, the Crank 10 is again in the horizontal position and power is cut off.

Functions of Hunting Gear

Consequently, one complete revolution of the steering wheel to the left from any given position will cause the helm to set itself ten degrees to starboard of the position that it originally occupied, and remain stationary at this new angle for as long as the steering wheel itself remains stationary.

Let the helmsman now make one complete turn to the right, which will return the wheel to 'midships.' In this case, the Threaded Rod 6, and with it the Crank 10, will rise, causing the power unit to move in a direction opposite to that in the previous instance, thereby starting the rudder moving back to the central position. But, at the same time, the Worm 12 will have a clockwise rotation, tending to lower the Threaded Rod, so that just as the rudder reaches the central position the Crank 10 will have returned to the horizontal, the power will be shut off, and the rudder will remain stationary as before until the wheel is again moved.

It should be sufficiently obvious from the above that rotation of the steering wheel in either direction immediately results in a corresponding movement of the ship's rudder, and that the latter, after the movement of the steering wheel

*We mentioned in the October "In Reply" page that we hope to introduce in the near future a Meccano Sleeve Coupling. This part, when ready, will serve admirably as a means of rigidly connecting together the Coupling and Pinion. Meanwhile, readers who prefer this method of connection to the soldering process may easily manufacture a part to serve the purpose from a ½" length of metal piping. This should have an internal diameter of ⅜", and must be drilled to receive the two set-screws.

ceases, remains stationary at the particular angle indicated by the new position of the wheel. Actually the movement is limited to three-and-a-half turns of the steering wheel to either side of midships, giving 35 degrees of rudder angle each side of the central position. This is the critical angle at which the biggest turning moment occurs; any larger angle would greatly reduce the ship's way and throw tremendous strains on the rudder bearings.

It should be borne in mind that, as long as power is available, the actual rise and fall of the Threaded Rod is very small, because the power gear is brought into operation on the instant that the Rod moves in either direction and, by revolving the Threaded Coupling, commences to return the Rod to its original position. It is this peculiarity of the mechanism that gave rise to its queer name.

In most cases hunting gear is arranged to operate a lapless valve on a steam engine, but there are also numerous electric steering gears, and this model of the apparatus may be employed to control the Meccano Electric Motor very effectively by causing the Crank 10 to operate a suitable rotary switch.

The application of hunting gear is not confined entirely to steering engines. An interesting and very different example of its use is afforded by a typical big power-operated railway turntable. This may have a number of lines radiating from it to various engine-sheds, but it is not necessary for the man in charge to watch the table revolve and operate his levers to nurse it into position. He has only to set his handle to the position corresponding to the line he desires to connect with, and the hunting gear fitted to the operating mechanism will bring the table exactly to the required point, and hold it there.

Exploring the Arctic—(*continued from page 727*)

Among the crew was a young man, named Greene, whom Hudson had befriended during the short time he was on shore. Greene was of dissolute and wasteful habits and it is difficult for us to understand why Hudson should have treated so worthless a young man almost as a son. At any rate, as we shall shortly see, it was to be a sad day for Hudson when he made the young man's acquaintance.

Hudson was exceedingly annoyed to find that his employers had appointed a mariner named Colborne to assist him in the navigation of his ship, an appointment that Hudson considered to be a slight upon his seamanship. Immediately before sailing (on 17th April, 1610) he sent Colborne ashore with a letter, slipped his anchor and thus the voyage began without Colborne!

When Greenland was reached, the ship ran into the ice and soon became fast. The crew at once turned troublesome and continued so, even although Hudson showed them that they had reached a position 100 leagues further north than any previous English ship. He appealed to them to make it possible for the ship to proceed on the voyage, but "some were of one mind and some of another, some wishing themselves at home and some not caring where so long as they were out of the ice. But there were some who then spake words remembered a great while after."

Further troubles followed—bad weather was encountered; the mate was deposed, and the boatswain, Robert Bylot, appointed in his place. Winter quarters were at length found at James Bay, and here the "*Discovery*" became locked in the ice for the winter. Troubles continued—food was scarce and the evil character of Greene, the ne'er-do-well, soon led to serious trouble. Williams the gunner died, and the crew quarrelled as to who should have his grey gunners' cloak. Greene, using his influence with Hudson, obtained it for his own use even though he was not paid any wages and could not therefore pay for the cloak as the others could have done. Soon after this episode Hudson quarrelled with the carpenter and Greene foolishly took the latter's part, at which Hudson was so angered that he took the gunner's cloak from him. From that moment Greene commenced to plan a terrible plot and joined with the men against Hudson.

Meantime, the crew were on short rations for three months, and at one time were compelled to eat frogs and even moss gathered on the shore. The ship, having been prepared for the return voyage, got under way on the 18th June, but owing to contrary winds she ran into the ice. Three days later Greene and another seaman proposed to the crew that they should turn "the master and all the sicke men" adrift in the small boat and leave them to their fate. The following morning the plotters seized and bound Hudson and such other members of his crew as it had been decided to place in the boat with him. After some terrible last moments on deck, when the list was finally made up of those of the crew who were to be abandoned to what was certain death, Hudson and his young son John, together with seven other men, were made to enter the boat. This was then cut adrift and Robert Bylot took over command of the "*Discovery*," which put on sail and was soon out of sight.

Nothing was ever heard of the small boat or its occupants, but as they were without food and were unable to steer a course through the ice, their tragic fate was certain. It only remains to add that the "*Discovery*" arrived in England in September, but the majority of the mutineers had died of starvation. Before leaving the Arctic some had been killed in fighting with the Eskimos and among these was the dissolute youth Greene. The story of the mutiny soon came out and the remainder of the survivors were thrown into prison, tried and convicted for their inhuman conduct.

As a result of Hudson's voyages a great whale-fishery sprang up at Spitzbergen and this industry had a direct effect on Polar exploration for, as a result of the voyages of the many bold whalers, knowledge of the islands in the Arctic, as well as of the varying conditions of the ice, was considerably increased.

My Flight to Australia—(*continued from page 761*)

of the job, for the work is almost half done before a start is made in having put down a successful organisation, and having had the aircraft fitted out correctly for the flight. For that reason I feel that those who had the task of reconditioning G–EBFO filled an important rôle in the London–Australia Flight, and in the same way the late Arthur Elliott, Sergeant A. H. Ward and C. S. Capel did their part maintaining machine and engine.

It must not be forgotten, too, that Captain G. de Havilland was the designer of the aeroplane, and that many more in the technical and drawing offices helped in its initial stages. Besides all these people there were hundreds who helped us en route, chief among them being the officials at every stopping place, the Royal Air Force, the Royal Australian Navy, the Royal Australian Air Force, and the Australian Department of Civil Aviation. Last, but not least, there were the officials of the Department of Civil Aviation who helped me to make all the preliminary arrangements before setting out.

From these few remarks it will be seen that my part of the flight was not quite so big as some people seem to imagine, but rather that my job was to make the best use of all the materials and facilities at hand to the greatest advantage and for the success of our Expedition.

[This article has been reprinted, by special permission, from the "D.H. Gazette"—EDITOR].



CHOOSE YOUR OWN CHRISTMAS PRESENT

An opportunity for *M.M.* readers

It is a wonderful sensation to sit down and study illustrations and descriptions, and select your own Christmas present. Try it! In our pages this month there are advertisers' announcements of all kinds of splendid toys, books, and all manner of articles for giving pleasure to boys at Christmas. We are going to make at least one boy happy by giving him the very thing he wants from amongst the articles advertised in our columns.

Look carefully at *all* the advertisements and decide which article you would like the postman to hand to you on Christmas morning. Write the name of it on the top of your postcard, marking it No. 1. Then write the name of the article that you would like second best and mark it No. 2. Do this with six articles altogether, write your own name and address at the bottom in very plain letters, and send the postcard to "Christmas Presents, *Meccano Magazine*, Binns Road, Liverpool."

To the sender of the list that corresponds most nearly in order of merit with the total voting we will post the article that heads his list, to reach him on Christmas morning.

"Christmas Presents" postcards must reach us not later than 18th December.

Books for Christmas

"The Boy's Own Annual!" (R.T.S. 12/6)

Year by year this old-established and typically British Annual is looked forward to with enthusiasm by many thousands of boys, and the present volume (No. 48) must surely be one of the finest yet issued. There are 765 pages of interesting reading with innumerable illustrations, and coloured plates showing the football colours of our Public Schools, the tartans of the Scottish Clans, etc. A series of particularly fine portraits includes the Prince of Wales, Earl Haig, Earl Beatty and the Chief Scout, Sir Robert Baden Powell.



As usual, the serial stories are of sterling quality and interesting from first to last. Among these may be mentioned specially "With Faith and Steel," an exciting yarn of the Crusades, and "The New House Master," a long story of school life full of interesting situations and thrilling adventures. There are also many other shorter stories. The practical articles cover an enormously wide range, including wireless, woodcarving, coins, nature study, games indoor and outdoor, and Scouting, while to many readers the series of articles on careers for boys will be of special interest. Yet another noteworthy feature is the inclusion of the words and music of several really jolly songs.

* * * *

"26 Good Stories for Boys"
(R.T.S. 3/6 net)



This book is well named, for the stories are indeed excellent. We are thrilled with tales of the days of King Charles, of shipwrecks, of life in Central Africa and in the Australian Bush of adventure in Spain and on the high seas, and even encounters with ghosts! In short, the book contains every variety of story that a boy's exacting fancy could demand and any reader who receives it as a gift this Christmas will be exceedingly lucky.

* * * *

"Empire Annual for Boys" (R.T.S. 5/– net)

This splendid Annual turns up again as good as ever in a striking cover representing a Zulu Dance in honour of the Prince of Wales, who is shown seated on his charger. Perhaps the feature that one notices first about the book is the remarkable variety of its contents. There are stories of school life and adventure, topical articles on sport and travel, stirring historical romances and thrilling tales of the sea. The practical articles deal with such varied matters as bird-stuffing and mounting, the running of a boy's cricket club, making a sun-dial, how to make camping a success, etc. The illustrations, both black-and-white and in colour, are numerous and excellent.



* * * *

"Warne's Welcome Books"
Frederick Warne & Co. Ltd. (1/– each net)

This series comprises a number of thoroughly good stories specially written for younger readers. The volumes before us include "Gunpowder, Treason and Plot," by A. Edward Chapman, an exciting story of the time of Guy Fawkes. "The House by the Chapel Rock," by Maud Morin, takes us to the wild coast of Devon and tells of the exciting adventures of a French girl who is smuggled into England. "The Old Oak Chest," by Dorothy MacNulty, concerns hidden treasure and a mystery of bygone days, while "Yasmin" by W. Haines Jull, is a rattling good story of the Crusades and Richard, Lion Heart. Finally, "In Quest of the Black Orchid," by C. Bernard Rutley, is a thrilling tale of the search for a wonderful flower in the heart of a wild and savage country. All the books in this series are well illustrated.



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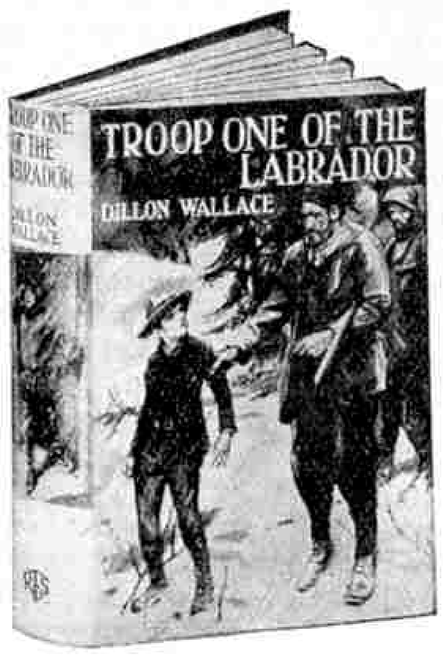
"The Secret of Smoking Swamp"
by T. C. Bridges

"The Sunken Million"
by D. H. Parry

"Manisty of the School-House" by A. L. Haydon
(Frederick Warne & Co. Ltd. 5/– each net)

These three new books for boys can be thoroughly recommended. "The Secret of Smoking Swamp" gives an excellent idea of life in Florida and it contains enough excitement to satisfy any reader. Commencing with a night hunt for 'possums, which results in an encounter with a panther, the story goes on to describe a series of thrilling episodes in the heart of a vast unexplored swamp from the centre of which there rises perpetually a mysterious giant plume of smoke. There is something exhilarating about the open-air atmosphere of this book that makes one feel better for having read it.



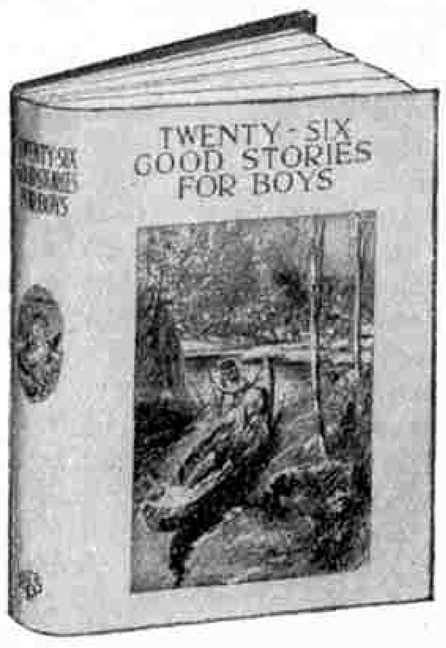


"The Sunken Million" takes us in imagination to an undiscovered people dwelling in a mysterious city in the heart of an island off the coast of Brazil. The story in the first place concerns the search for a vast sum of money lying at the bottom of the sea, in twelve fathoms of water, and the attempts of a gang of unscrupulous blackguards to deprive the rightful owners of their wealth. The journey into the interior and the final discovery of the Valley of the Golden Dead is full of excitement, thrilling incidents crowding one on top of the other. The story ends in dramatic fashion with the death of the principal villain just after he has murdered his partner and is congratulating himself on having no one to share his ill-gotten gains.



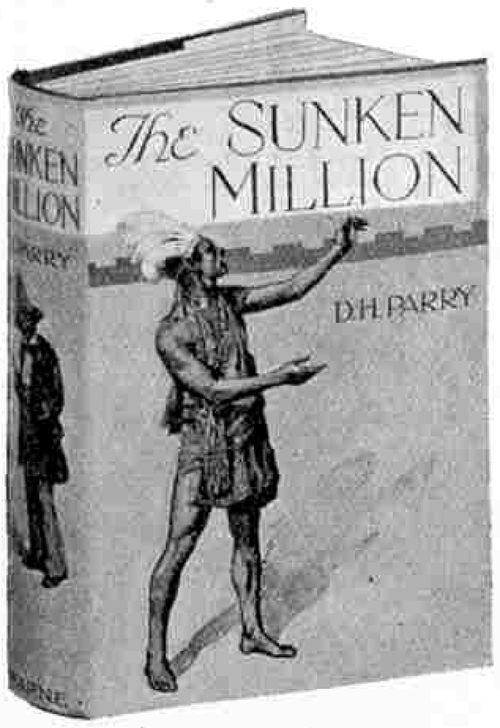
"Manisty of the School-house" is a typical good-class school story. The inner life of the school is excellently described and the reader soon becomes intensely interested in the little plots and counter-plots that develop among different sections of the boys. There is sufficient excitement to satisfy all tastes and the final dramatic episode which results in the downfall and disgrace of a master and one of the senior boys, is told in a remarkably graphic manner.

Each of these three books has a frontispiece in colours and other illustrations.



"The Boy Ivory Hunter" by G. W. Payne. (Epworth. Price 3/6)

This is the story of a daring English hunter, whose courage and prowess is nearly equalled by that of his son, and for those boys who love stories of jungles and lions there are many thrills in store.



Life for the hunter is never a dull affair, but when the quest for a hidden store of ivory is commenced, there is the opposition of native tribes to be reckoned with, in addition to the usual dangers of forest and jungle.

Lions, elephants and native enmity are each in turn bravely overcome, while even the "spectre of the mountain," of which nothing but the glowing eyes have ever been seen, leaves the young hunter undaunted, though sorely puzzled. Being a British boy he cannot leave the mystery unsolved and the natives still in terror, of course, and it is to his determination to settle the question of the spectre once and for all, that we owe one of the most thrilling chapters of the book.

* * * *

"Bruce the Troop Dog" by F. H. Dimmock (Pearson. 3/6)

This book is for the boy who treats dogs as friends; who understands and looks after them, and recognises their intelligence—for it is a boy such as this who is the hero of this book, the owner of Bruce, the Troop Dog.

Bruce is a lucky dog indeed, for his master Dennis is a fine fellow, a Scout of the best kind, a dog-lover and an open-air boy who is a credit to his troop and the whole Scout training. Dennis finds the dog when a puppy, takes care of it and subsequently shares all his adventures with his dog-chum. The troop to which Dennis belongs is an active one and adventures are many and thrilling. Bruce learns to understand the Scout whistles and calls, and obeys orders like a well-trained member, and on more than one occasion he renders invaluable aid to Dennis and other members of the troop. When it comes to tracking and catching poachers Bruce enjoys himself immensely and helps to bring further credit to an already renowned troop.

* * * *

"Clinton's Quest" by P. F. Westerman. (Pearson. Price 3/6)

As Clinton naturally objected to someone in the school pilfering his stamps he set an ingenious trap, but had the misfortune to catch the Head instead of the thief! By the end of the fifth chapter we have finished with Clinton's school life, and are sailing away with our hero to the West Coast of Africa, Clinton now being the youngest member of a party seeking oilfields.

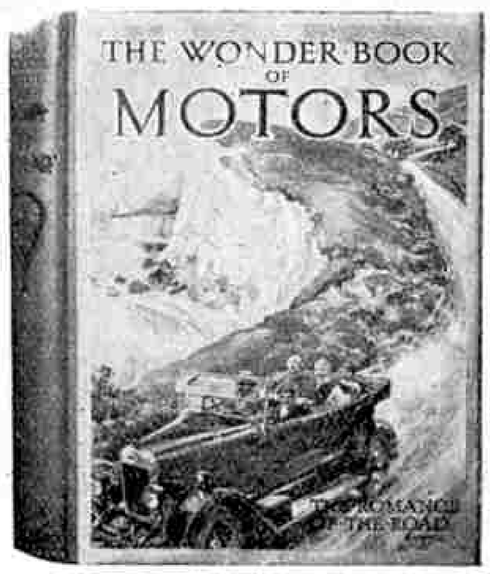


Clinton is a healthy determined son of a soldier, and has numerous adventures in a land reached only through swamps and sluggish creeks. There are difficulties and dangers to be faced by explorers in such regions, and the behaviour of one or two faithful Kroomen is a refreshing relief after that of the faithless and easily-scared blacks. There is not a dull chapter in the book and with eight excellent illustrations, the book will prove a welcome addition to any boy's library and one that will doubtless be re-read many times.

* * * *

"The Wonder Book of Motors"

Motoring to-day is far indeed from being merely the pleasure of the rich. Cars and motor cycles are daily growing cheaper and more reliable, and even the poorest have at their command the wonderful services of buses and chars-a-bancs that make the beauties and interests of the countryside accessible.



This book contains 256 pages, 10 coloured plates and over 300 illustrations of motors and motoring. A valuable feature are the two double pages, showing (in colours) radiator badges of well-known cars. The articles in the book include such subjects as:—Motor Camping; Aristocrats of the Road; Village and Other Signs; The Principles of the Motor Engine; Feeding, Firing and Cooling the Engine; Gears, Clutch, Transmission, Lighting, etc.; Military Motors; The First Roads; Family and Touring Cars; The Omnibus in Town and Countryside; Through Africa by Motor; Motor Cycling; The "Goods Trains" of the Roads; "What Car was That?"; By Bus Across Britain; Motors in Public Service, etc.



Every reader of the *"M.M."* who enjoys an occasional outing by car will want this book. It is simply and pleasantly written, and will not only tell them a great deal, but put them in the way of learning and enjoying much more. There are crowds of pictures, not only of motors but of the things that motors enable us to see, and even grown-up users of the roads will find in it much of interest, possibly also of amusement and instruction.

* * * *

"The White Hawk" by K. Carr. (Chambers. Price 4/-)

From the first page, when we are introduced to the young English hero—Jaspar Hawksley of Cumberland, who is travelling through Holland to join his uncle—we feel that here is a boy who will well uphold the honour of his family and his country. Nor are we disappointed, for the moment young Jaspar sets foot in his uncle's home, before he has gone beyond the entrance hall his adventures begin. In assisting to defend little Jacqueline on the first day of his arrival, Jaspar is brought into contact with a Dutch boy Pieter. After a fight there springs up an enduring friendship between the two boys! Jaspar, quick of wit and ready of tongue, court-bred and elegant, and a splendid swordsman withal, wielding a weapon presented by Queen Bess herself, and Pieter, faithful and staunch, with a wonderful knowledge of the highways and byways of the town, and of the low-lying marshy district around, have many thrilling adventures. Well written, with a splendid plot and several excellent illustrations in keeping with the spirit of the story, it is a book that should become a great favourite with boys and we can but hope the author in good time will tell us more of the doings of Pieter and Jaspar.

* * * *

"Colin the Scout" by Lt. Col. Brereton. (Blackie. 5/-)

"You won't even see a pirate through a pair of binoculars, and will reach Yokahama without one untoward incident. All the same there are pirates, lots of 'em too, lying in the mouths of Chinese rivers, waiting to pounce upon any unwary and poorly armed ship of the tramp class that happens to pass. You see reports of them in the newspapers every now and again." This certainly promises well and the reader is not disappointed for this is another stirring story by this well-known author. Had Colin remained in England there is no doubt that he would have developed into a highly respected and valuable citizen, but since Fate decreed he should sail, for Japan he was enabled to prove his value to humanity in general and the British Empire in particular.



Colin's early Scout training serves him in good stead, for it has taught him to keep a keen look-out, to keep himself well under control, and to use his wits quickly. When he is taken aboard a tramp steamer in the Chinese seas and the tramp falls into the hands of a ferocious band of Chinese pirates, he has need of all his training and resourcefulness, as readers of the book will agree.

My Flight to Australia

By Sir Alan J. Cobham, K.B.E., A.F.C.

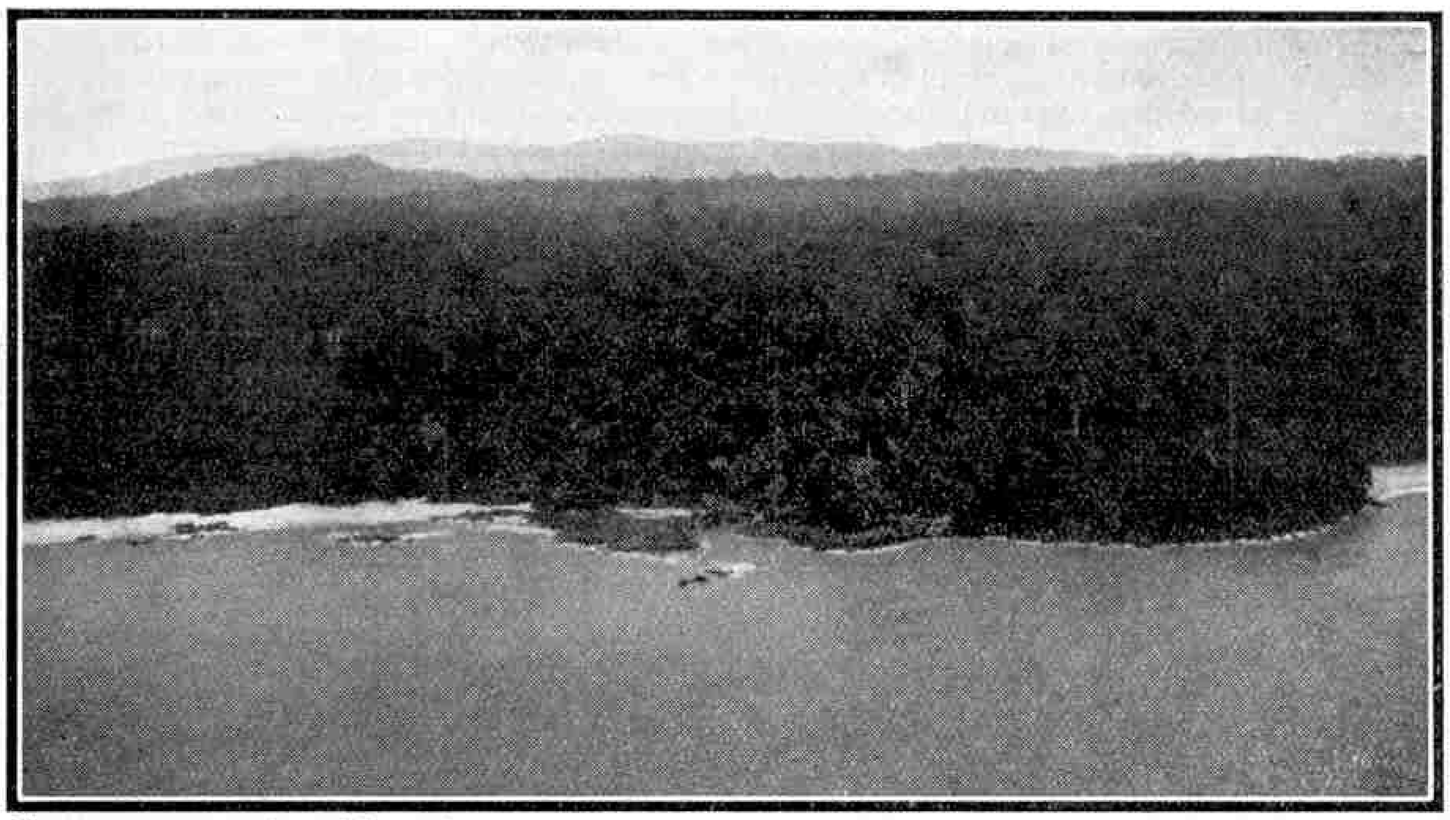


Part of the huge crowd tnat greeted Sir Alan Cobnam at Melbourne

DURING the last two or three years I have been engaged more or less continually on long distance flights. As the same D.H.50 machine has been used throughout I am sure that the de Havilland Company—and all their employees, who either directly or indirectly were concerned in the manufacture of the well-known G–EBFO—must take a keen pride in the fact that they built, or had something to do with the building of, the aeroplane that has made history in pioneer Empire flights under varied and trying conditions.

The D.H. Type 50 was designed and built in 1923, when three machines were laid down. On the first one, G–EBFN, I was fortunate enough to win the Traffic Competition, which carried with it a prize of £1,000 at the Gothenberg International Meeting.

Since that time, G–EBFN has carried out many flights and is now, I am told, being used on Western Australian Airways' Service between Perth and Derby, which has maintained such a wonderful record of reliability. Another machine of the same batch is still used by Imperial Airways as a taxi-plane, but none has travelled quite so far as G–EBFO. I doubt whether those who worked on her ever dreamed that she was destined to carry out so many Empire flights.

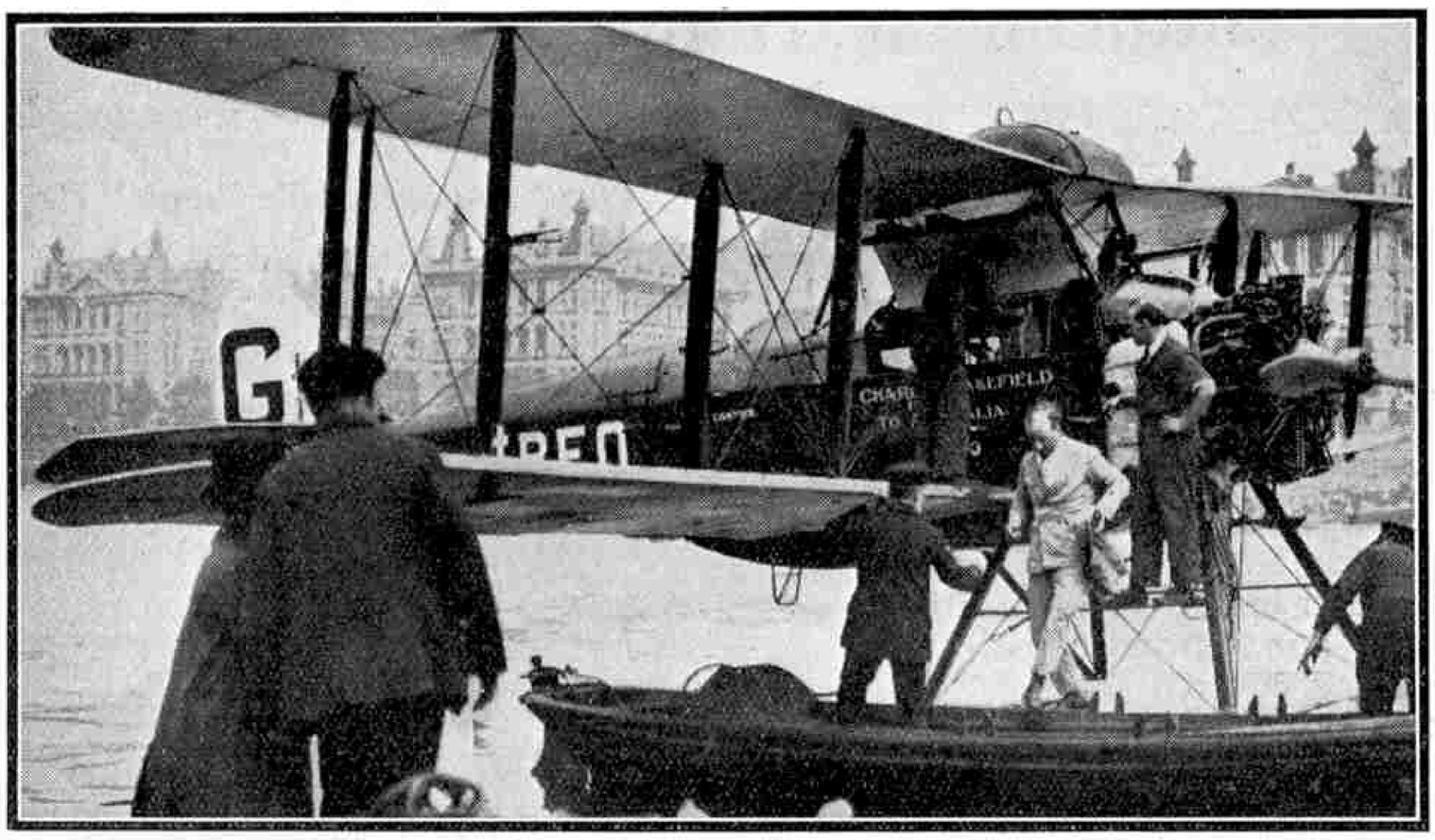


The wooded coast-line of Sumatra—a photograph taken by Sir Alan Cobham from the cabin of the D.H. 50

Naturally G–EBFO has been reconditioned and adapted to take the Siddeley "*Jaguar*" engine, but the fact remains that the fuselage and the main structure are the same as when she was pushed out on Stag Lane Aerodrome for her trial flights. One has

only to tap the 3-ply and inspect the tail to convince oneself that she is as good to-day as in 1923 and, what is more, she is thoroughly seasoned.

I thinkthe fact that she is so well seasoned was one of the chief factors that contributed to her success on the last flight, when she had to stand up to very trying conditions varying from long spells of dry tropical heat to many days of torrential rain, such as is never known in these islands.



Sir Alan Cobham stepping from the D.H. 50 on his arrival in the Thames, after his 26,000 mile flight

In support of this argument I would cite my experience on the Cape Flight. Before departure it was found advisable to fit a new plane after a slight accident at Stag Lane. When at Pretoria, after travelling through the tropics, the planes were opened up for an inspection of the interior, and it was found that the new one required more adjustment than those that had been on the machine since its original construction. I was not surprised, therefore, when with the assistance of the Royal Australian Air Force at Melbourne, we inspected the internal bracing, we found that practically no adjustment was anywhere needed.



Map of the route followed

It is interesting to note also that the wings were not re-covered before we started on the Australian Flight, but that the fabric and doping scheme, with the exception of a freshening coat of varnish, was exactly the same as when it flew to the Cape and back.

On the last flight we were able to try out remedies that had been suggested by the difficulties encountered on the Cape Flight. We have now accumulated a mass of data that will enable us to combat the terrific heat of Mesopotamia and the Persian Gulf when it is necessary to fly all through the day; we have learnt about oil-cooling and more about air ventilation; also we have learnt a little more about the performance of the de Havilland seaplane and we can make a few suggestions for new type aircraft intended to fly through the deluge of the monsoons.

My chief impression of the whole flight, from an aeroplane point of view, is that every aircraft to be used on the great Empire air routes should be completely self-contained. By this I mean that the aeroplane should be able to live without a hangar; there should be sufficient shelter in the actual aircraft for passengers and crew whatever weather conditions may be encountered; and it should be possible to maintain the machine without the assistance of any aerodrome or seaplane base facilities. The crew should be able to overhaul and work on the engine and machine with perfect freedom and ease without the assistance of any external appliances. Thus, equipped with its tool kit and necessary spares, the Empire Air Liner could be maintained in the same way as a ship that seldom comes into dry dock.

Our flight to Australia and back was marred by one tragedy, the loss of Arthur Buller Elliott who, to my mind, was one of the finest examples of what an aircraft Maintenance Engineer should be. I think the secret of Elliott's success lay in his thorough knowledge of the machines with which he had to deal, his happy knack of never being defeated by difficulties, and by the method with which he always organised his jobs. I feel somehow that his loss cannot be replaced and there was a time at Basra when I even contemplated giving the flight up. Thanks to the kind encouragement of all at home, however, I was enabled to carry on.

Our main object, so far as the flying was concerned, was to go to Australia and return to the place we had started from in more or less the same condition as we had left. In doing this, we were the first to accomplish the return journey, our flight from Melbourne to London having occupied 32 days and from Port Darwin to London 26 days.

So many people imagine that the success of a flight depends on the dexterity of the pilot. I can assure everyone that this is only a small portion (*Continued on page 757*)

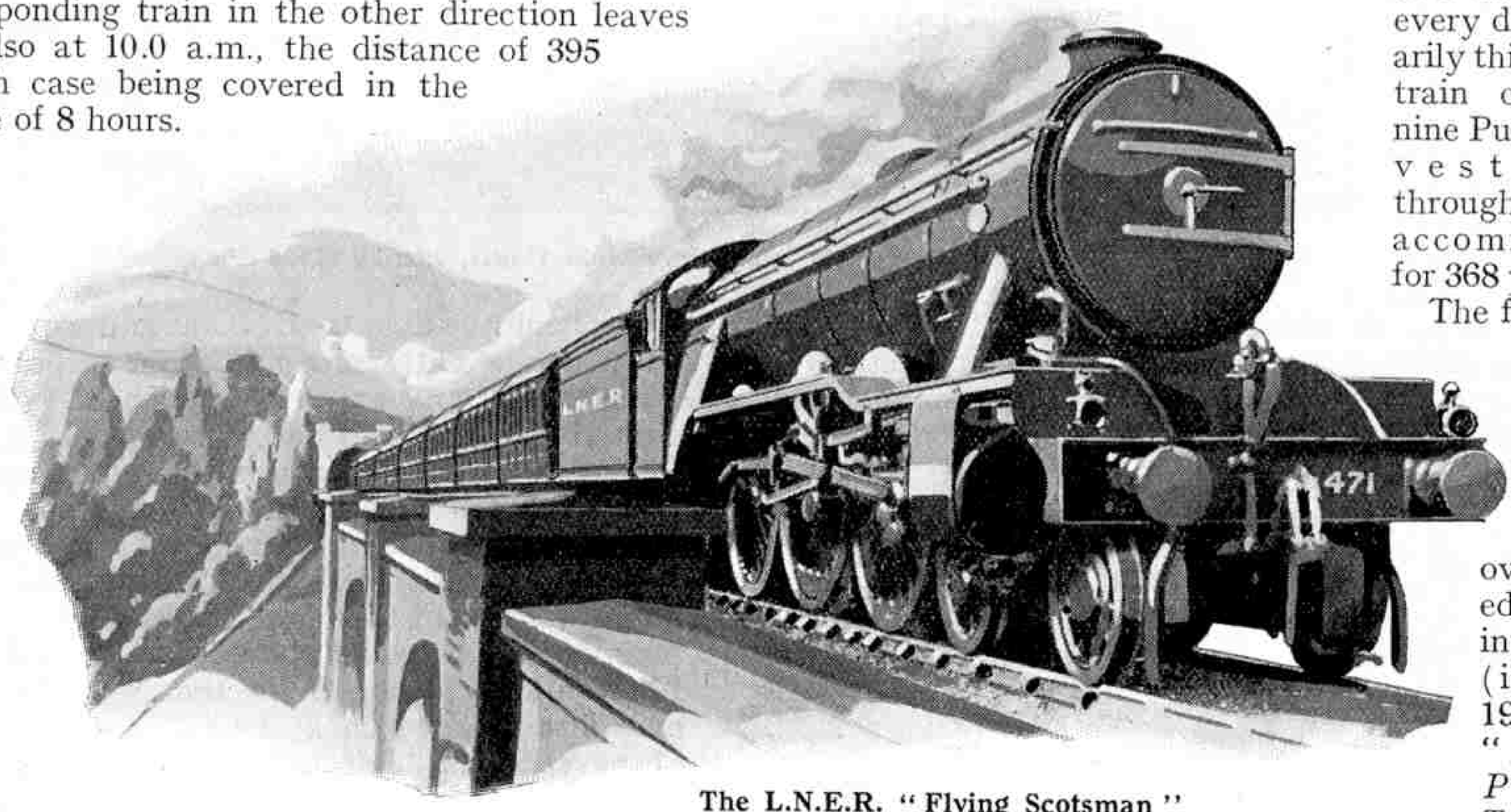
Some Famous Express Trains

Pullmans at Home and Abroad

UNDOUBTEDLY the most famous of all British trains is the "*Flying Scotsman*," the fame of which is world-wide. This train has been running regularly since 1850 and its comfort and punctuality quickly brought it into such favour that its name soon became a household word. For twelve years the express left London at 9.30 a.m., but in June 1862, in order to meet public wishes, the time was altered to 10 a.m., and for 63 years the train has left King's Cross daily at that hour without a break.

The corresponding train in the other direction leaves Edinburgh also at 10.0 a.m., the distance of 395 miles in each case being covered in the schedule time of 8 hours.

As in the case of all other up-to-date expresses, this East Coast express is steam-heated and electrically lighted throughout. It has always been the last word in advanced railway practice and its coaches are now constructed on the articulated principle.



The L.N.E.R. "Flying Scotsman"

G.W. "Cornish Riviera"

Very little behind the "*Flying Scotsman*" in reputation, and nothing behind it in popularity, is the Great Western Railway's "*Cornish Riviera*" Express, also known as the "10.30 *Limited*." This train daily covers the 225.7 miles, Paddington to Plymouth, without a stop in 247 minutes, this being the longest regular non-stop run in the world. The final destination of this famous train is Penzance, between which and Plymouth there are some extraordinarily difficult gradients and several stretches of single line. To accomplish this run of 305 miles in $6\frac{1}{2}$ hours from start to finish necessitates the very best locomotive work. The train is composed of 10 or 12 of the latest 70 ft. carriages, the seats in which are all numbered and may be booked in advance.

Few trains can surpass the "10.30 *Limited*" for smooth and easy running. It is hauled by one of the latest and most powerful express locos, and there is no difficulty in maintaining the speed schedule. Indeed, the "10.30 *Limited*" frequently runs into North Road Station, Plymouth, several minutes in advance of booked time.

The "Southern Belle" and "Harrogate Pullman"

A train for long regarded as one of the most luxurious in the world, is the "*Southern Belle*," a Pullman Train, running on the Southern Railway between London and Brighton. This train, inaugurated on 1st November, 1908, originally accommodated first-class passengers only and ran only on Sundays, but later third-class cars were added and the train ran every day. Ordinarily this luxurious train consists of nine Pullman cars, vestibuled throughout, with accommodation for 368 passengers.

The fame of the "*Southern Belle*" has been somewhat over-shadowed by the inauguration (in July, 1923) of the "*Harrogate Pullman*." This fine train was originally intended to run between London and Harrogate only, but the L.N.E.R. subsequently decided to extend the service to Newcastle and Edinburgh. The timing of the run is so smart that the train reaches Tyneside only a few minutes later than would be the case if it were booked to run direct via Selby and York.

The "*Harrogate Pullman*" was intended in the first instance to be a summer luxury, but it proved so popular that it was retained in the winter time-table, and is likely to remain a permanent feature.

The train starts from King's Cross and the first stop is Leeds, a distance of $185\frac{3}{4}$ miles, which is covered in three hours 25 minutes. Harrogate, $203\frac{3}{4}$ miles, is reached in four hours, and the whole journey of $395\frac{1}{4}$ miles between London and Edinburgh, including stops, is accomplished in 8 hours.

The "Wild Irishman" and other famous Trains

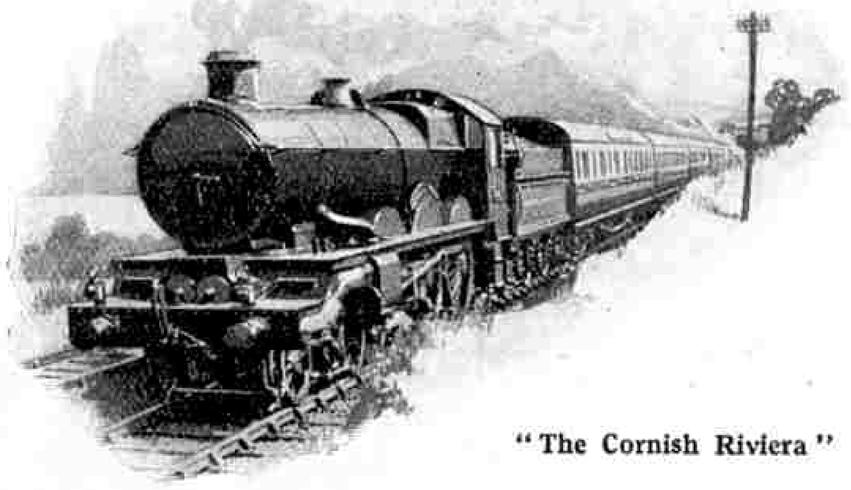
Among other popular long-distance expresses is the "*Sunny South Special*," composed of up-to-date L.M.S. stock and starting daily, in separate sections, from the northern termini at Liverpool and Manchester. The sections are united at Crewe, and travel thence to Willesden Junction with an intermediate stop at Rugby. From Willesden a Southern Railway loco hauls the

"*Sunny South*" to Brighton, Eastbourne and the Kentish coast resorts. The inception of this train was due to the unpopularity of the Southern watering places with north-country folk, owing to the trouble of transferring themselves and their luggage across London to Victoria or Charing Cross.

The "*Wild Irishman*" or "*Irish Mail*" is one of the fastest out of Euston, which it leaves every night in connection with the Holyhead-Greenore steamers. The section from Chester to Holyhead, including the difficult approaches to the Britannia Tubular Bridge crossing the Menai Straits, is covered at an average speed of over 52 m.p.h.

No list of famous British express trains would be complete without mentioning two Scottish services. The "*Tinto*" express, which for many years has left Glasgow Central at 1 p.m. for the residential districts of Lanarkshire, is a most comfortably equipped train. Special twelve-wheeled corridor carriages were built for this run, and prior to the new grouping arrangements, the "*Tinto*" and "*Grampian*" expresses were the pride of the Caledonian Railway. "*Tinto,*" incidentally, is the name of a great conical hill, which overlooks Lanarkshire and Central South Scotland, where, in the neighbouring hills the Clyde has its source. The "*Grampian*" Express goes north to Aberdeen via the Caledonian main line, and on account of the severe gradients to be surmounted it needs the best efforts of the Scottish locos to keep to time.

Both the "*Tinto*" and the "*Grampian*" expresses are unique in having their respective names permanently emblazoned in gold letters on the carriage sides, the special rolling stock being reserved for these particular trains.



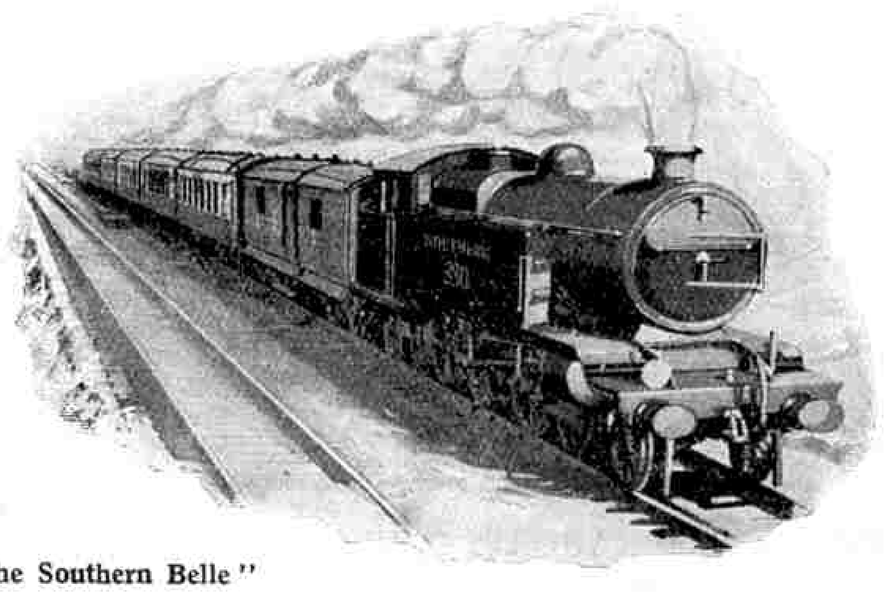
"The Cornish Riviera"

Famous Continental Trains

On the Continent there are many trains whose names are familiar to everyone interested in the world's railways. The most familiar one is probably the "*Orient Express,*" which links up London with Constantinople. Before the war this famous train reached Vienna via Strasbourg, Stuttgart and Munich, but a more southerly route is now followed, via the Simplon Tunnel, Milan, Trieste and Belgrade. This alternative route saves 263½ miles between Paris and Constantinople.

Leaving Paris three times weekly, the eastbound "*Orient*" runs over the P.L.M. Railway via Dijon and Lausanne to Brigue, 408¾ miles, and near the latter station it plunges into the Simplon, the longest tunnel under the Alps (12½ miles). The express is now in Italy, and the next important point is Milan, where another section of the train from Amsterdam, Ostend, and Brussels—via Strasbourg and Basle, and through the Alps by the first Swiss tunnel, the St. Gothard—joins the Paris portion. The train now continues through Venice and Trieste to Vinkovci, 1,141¼ miles from Paris, and at this junction the Bukarest portion turns northward via Orsova.

The Constantinople section continues eastward through Belgrade, drops at Nisch the carriages destined for Athens, and after halts at Sofia and Adrianople pulls up for the last time, on the shores of the Bosphorus, having covered in all 1,905¾ miles. The full time taken is 84 hours, including halts, and making allowance for the time spent at stations, frontiers, passport points, etc., the average speed works out at 27 miles an hour.



"The Southern Belle"

The "Blue Express"

Another famous train linking the capitals of Spain, Portugal, and France is the "*Sud Express.*" Its run is 1,187 miles from Paris to Lisbon, and 909½ miles to Madrid. The first section of the journey, Paris-Biarritz, 497½ miles, is run with eight stops at the good average speed of 50.5 m.p.h. (excluding halts). On the final sections to Lisbon and Madrid—the express being divided at Medina del Campo, 772 miles south of Paris—the average speed is only about 35 m.p.h.

A splendid express known as the "*Cote d'Azur Limited*" serves the Pyrenees and Basque Coast and, as its name indicates, provides only restricted passenger accommodation. The most recently inaugurated express, and certainly the most palatial one, is the "*Calais-Mediterranean Express,*" more familiarly called the "*Riviera Limited*" or the "*Blue Express.*" This train has been put on to meet the requirements of wealthy passengers from London, and America via London, to the fashionable French watering-places, and in the matter of luxurious sleeping-car accommodation it is unequalled. The vehicles are the property of the International Sleeping Car Company and are built of steel, wood being used for internal decoration only. The exteriors are elaborately finished in royal blue panelling with gold-leaf lining, hence the title of the train.

It will interest our readers to know that a model of this famous train is now available in the Hornby System.

In conjunction with the "*Blue Express,*" the Southern Railway has introduced a "*Pullman Limited*" upon the 77 miles between London and Dover, and the luxurious train awaits the boat at Calais. By this train it is possible to travel from London to Cannes or Nice in about 24 hours in the utmost comfort.

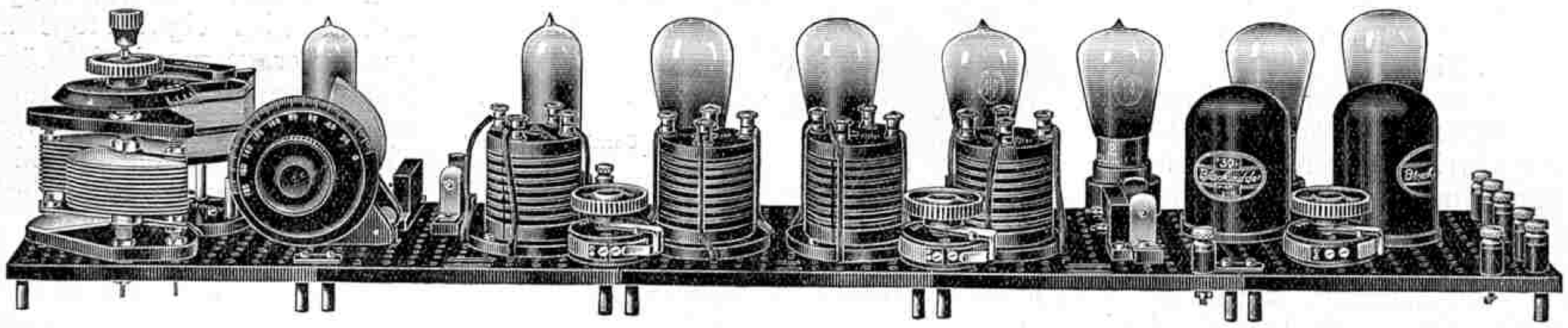
Famous Trains of Canada

As might be expected, Canada, with its vast distances, provides some interesting examples of expresses, and to-day the Canadian National Railways, comprising 22,660 miles of line, have nothing to fear in comparison with other railways throughout the world. One of the most famous of Canadian trains is the "*Continental Limited,*" which leaves Montreal and Vancouver every day.

The route is through the Rocky Mountains by way of the Albreda and Yellowhead Passes and across wide stretches of prairie. Each train consists (*Continued on page 765*)

A FASCINATING XMAS GIFT

You will find it simple to build a super efficient wireless set without any previous technical knowledge



If you adopt the BLACKADDA RADIO BUILDING SYSTEM

"As Easy as Meccano"

There is no more interesting field for an amateur constructor to explore than Wireless. Hitherto, however, the requisite technical knowledge and expense have deterred many from carrying out their wishes. The introduction of the Blackadda method has changed all this and made this hobby possible for even those without previous experience and of limited means.

The simplicity of this system will appeal to all. The ability to build up any circuit with the greatest ease, and then to alter when desired to other circuits, to conduct numberless experiments, renders the "Blackadda way" a boon to the novice as well as the expert.

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Parts can be used over and over again; even the wiring is supplied in six standardised lengths fitted with terminal loops. For connections the loops are simply slipped into position and held by nuts. No soldering is required.

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Each component is given an Adda Number. The moulded base standing on four brass legs, has 140 equally spaced holes, also numbered. To construct, the components are fitted through indicated holes and nutted up on the back of the panel. Wiring is effected by joining from point to point in accordance with plan of circuit. That's all!

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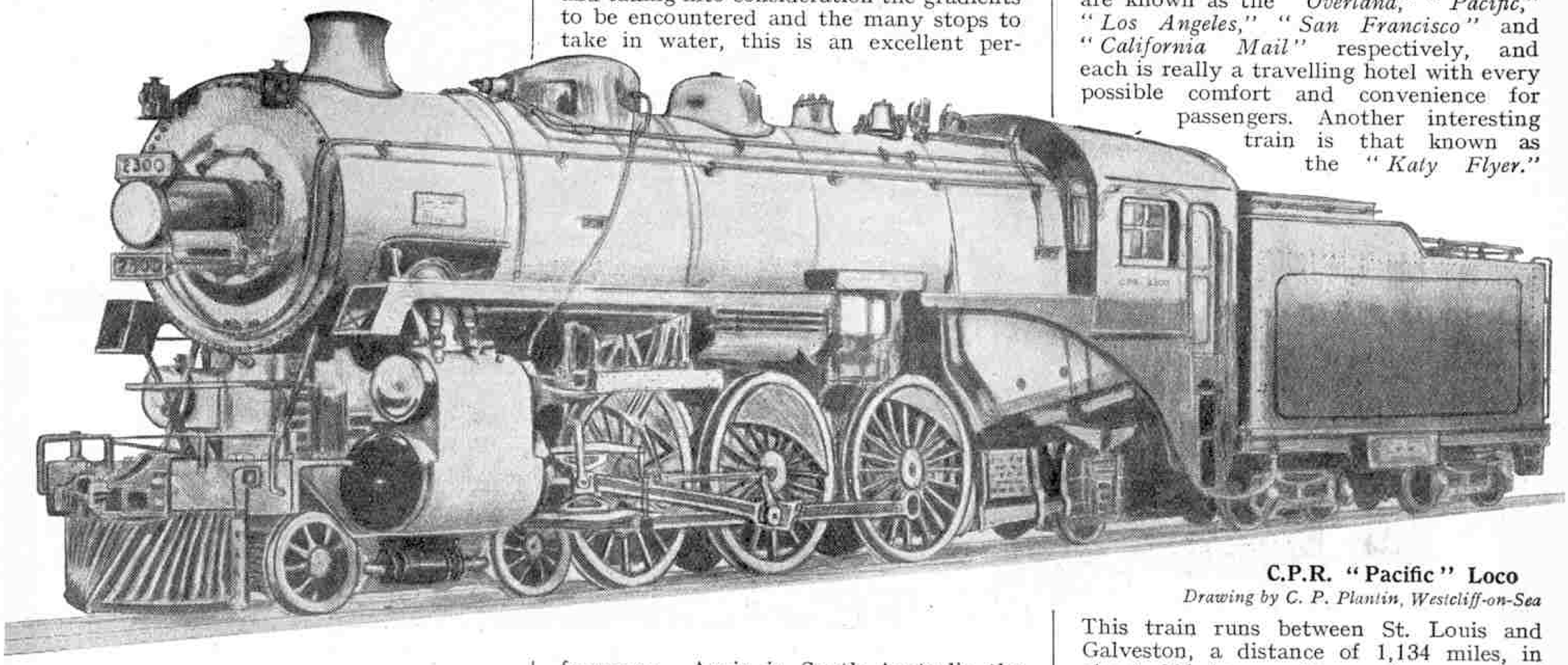
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Your Achievement will be the Envy of Your Friends

Famous Express Trains—(*cont. from page* 763)

of eight coaches, including first-class and colonist or third-class cars; sleepers; dining car and observation car, the last-named providing unrestricted views of the magnificent scenery through which the railway passes.

Two other famous trains are the "*National*," running between Toronto and Vancouver, and the "*Maritime Express*," the latter covering the 842 miles between Halifax and Montreal in one day, 11 hours, 35 minutes.



C.P.R. "Pacific" Loco
Drawing by C. P. Plantin, Westcliff-on-Sea

The trans-continental trains of the Canadian National Railways are hauled by fast locos of what is known as the "*Medium Pacific*" type. These locos have cylinders 23½ in. by 28 in., driving wheels 69 in. in diameter, boiler 70⅝ in. in diameter, supplying steam at a pressure of 200 lb. The eight-wheeled tender carries 6,500 gallons of water and 22,400 lb. of coal. The complete loco in working order weighs 416,600 lb. and the total wheel-base of loco and tender is 66 ft. 4¾ in.

The C.N.R. were the first railway system in the world to adopt wireless as a part of their regular service. To-day all the C.N.R. trans-continental trains are equipped with receiving sets—headphones and loud speakers—which keep passengers in touch with the events of the day and provide entertainment during the journey of 2,937 miles, occupying four days, 9 hours, 10 minutes.

The enormous weight of the Canadian trans-continental trains has led to the development of specially heavy and powerful locos. These include the famous "6000" type which were built at the Kingston, Ontario, works for the C.N.R., and which are the largest passenger locos operated in Canada. An even more powerful loco, No. 4100, has been built for hauling heavy freight trains. This loco, which is of the Santa Fé type, is 92 ft. in length overall and weighs 325 tons. Its height is 15 ft. 3 in. and the smoke-box alone has a diameter of 97 in.

This monster is capable of developing 3,200 h.p.

Australian Expresses

Railway development in Australia has been hampered to some extent by the differences of gauge in use in the different States. None the less, the Australian railway service to-day has reached a very high standard and all the State capitals are linked up by efficient services. Starting from Central Station, Sydney, for instance, the "*Melbourne Limited*" completes its journey of 401 miles in exactly 12 hours, and taking into consideration the gradients to be encountered and the many stops to take in water, this is an excellent performance. Again in South Australia the "*Broken Hill*" express accomplishes a journey of 334 miles from Adelaide in 15 hours, and another train running to Oodnadatta in the interior covers 689 miles in 34 hours' actual running time.

The Australian "*Transcontinental Limited*" is undoubtedly one of the finest trains in the world. It consists of drawing room—complete with piano—smoking, observation, dining and sleeping cars, each of which is fitted up in luxurious style. The express is electrically lighted throughout. The average speed for the 1,051 miles between Port Augusta and Kalgoorlie is a little over 27 miles per hour, but this speed will almost certainly be increased later. The whole distance is covered in 38¾ hours. An interesting and rather unusual feature of this train is a special car accommodating eight travellers, which can be engaged by a party desiring to travel in private.

In pre-war days one of the most remarkable railways in the world was the trans-Siberian Railway. This remarkable line, 5,425 miles in length, brought London within 15 or 16 days' travel of Japan. Leaving London on a Monday morning and travelling via Ostend, it was possible to be in Moscow on Wednesday night and ten days later to steam into Vladivostok station. The trans-Siberian trains had everything possible in the way of comfort, and no matter what might be a traveller's nationality he was certain to find attendants able to speak his language. A noteworthy feature of these trains was the provision of a Church car in which services were held en route.

Famous Trains in the United States

Railway travelling in the United States is highly developed and the long-distance expresses are very fine as regards both speed and comfort. The first through service linking the East and West coasts was inaugurated in 1869, and in the following year a luxurious Pullman train known as the "*Hotel Train of 1870*" was in service. This train ran once a week and it carried two complete crews who took duty in turn.

To-day five magnificent "*Limited*" expresses are run between San Francisco, Los Angeles and Chicago. These five are known as the "*Overland*," "*Pacific*," "*Los Angeles*," "*San Francisco*" and "*California Mail*" respectively, and each is really a travelling hotel with every possible comfort and convenience for passengers. Another interesting train is that known as the "*Katy Flyer.*" This train runs between St. Louis and Galveston, a distance of 1,134 miles, in about 36½ hours. The curious name of this express has resulted from the combination of the initials of two of the States forming the title of the company—The Missouri-Kansas-Texas Railway.

Another magnificent express on this line is the "*Texas Special*," the "*Pacific*" locos hauling which are oil fired. The "*Panama Limited*," running between Chicago and New Orleans is a specially luxurious train that carries only one class of passengers. The distance of 922 miles is accomplished in an actual running time of 22¾ hours and the train has a splendid reputation for punctuality.

One other United States train may be mentioned, that known as the "*Merchants' Limited*," running between New York and Boston. This train runs daily, except Sundays, and from its inauguration in 1903 it has been extremely popular with business men. Its scheduled time for the 229 miles is 5 hours 10 minutes.

The appointments of this train have been specially devised to meet the requirements of business men and it resembles to a great extent a palatial travelling office. Normally the train consists of four 36-seat parlour cars; two 32-seat drawing room parlour cars; two 42-seat dining cars; a composite baggage and smoking car and a 40-seat observation car. Each dining car cost about £5,300 and each parlour car about £4,000.

Hobbies 1927 Catalogue

The catalogue of Hobbies Limited becomes a more amazing production year by year. Already it has extended to some 250 pages containing many hundreds of illustrations. The greater portion of the catalogue deals with appliances and materials for fretwork, Antofret, picture-framing and woodwork of all kinds, and enthusiasts in any of these hobbies will find almost every possible requirement provided for.

The section devoted to fretwork designs is particularly interesting as showing the apparently endless variety of articles, useful and ornamental, that may be produced by the fretworker. Another feature that will interest all Meccano boys is the description of the Hobbies fretwork factory and the accompanying photographs of the various departments.



"Let's see the colours"

These boys are all aglow with excitement over the New Meccano in Colours. The Plates enamelled in red and the Braced Girders in green, in combination with the shining steel Strips and bright brass Gear and Pulley Wheels, give a wonderful appearance to Meccano Bridges, Towers, Cranes, and the hundreds of other real engineering models that only Meccano can build.

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The New Meccano Book will tell you all about it—in colours. It will show the new Accessories and Outfits, as well as new models accurately constructed, just as you—and even your Dad—can construct them.

Supplies of this book will not be available until 15th November but all readers of the "*M.M.*" desiring copies should at once send in their applications together with the names and addresses of three of their chums. All requests will be dealt with in strict rotation. Send a postcard to Meccano Ltd., Dept. M.B., Binns Road, Liverpool, to-day.

THE NEW MECCANO

PRICE LIST

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No. 00	Meccano	Outfit	...	Price	3/6	No. 00A	Accessory	Outfit	...	Price	1/6
No. 0	„	„	...	„	5/-	No. 0A	„	„	...	„	4/-
No. 1	„	„	...	„	8/6	No. 1A	„	„	...	„	7/6
No. 2	„	„	...	„	15/-	No. 2A	„	„	...	„	8/6
No. 3	„	„	...	„	22/6	No. 3A	„	„	...	„	18/6
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No. 5	„	„	Wood ...	„	85/-	No. 5A	„		Wood	„	80/-
No. 6	„	„	Carton ...	„	105/-	No. 6A	„	„	„	„	210/-
No. 6	„	„	Wood ...	„	140/-						
No. 7	„	„	„ ...	„	370/-						

Each Outfit contains a beautifully illustrated Book of Instructions.

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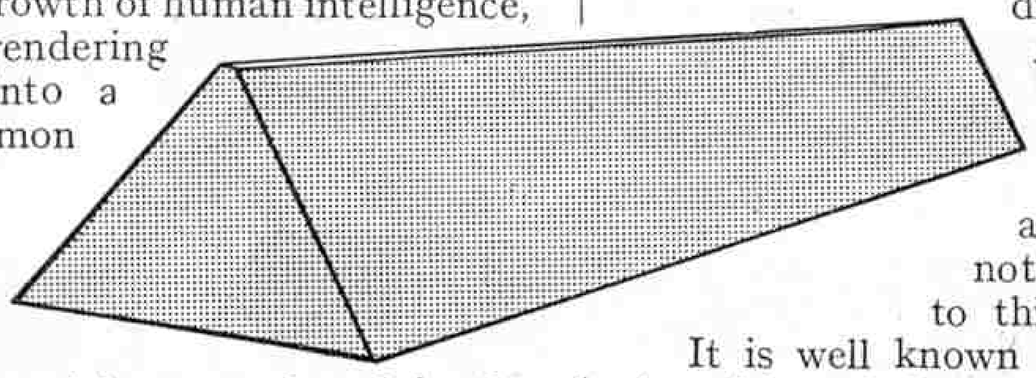
MECCANO LTD. Binns Road LIVERPOOL

Noah's Ark was a Masterpiece

A Mystery of Correct Engineering Design before the Flood

By E. Dulais Morgan, B.Sc.

IT is believed that many of the romantic tales treasured in folk lore and legend have been founded on some actual event in the dim past of the people. The recounting of a tale from generation to generation would be sufficient to account for the distortion of the main truth from its originally correct version. The addition of explanations and embellishments at intervals, in keeping with the growth of human intelligence, would account for the rendering of any particular story into a form that is now our common heritage.



It is of singular interest that the Biblical story of the Deluge is not the only record of such an event. Indeed, legends of a deluge are found in the folklore, or early literature of almost every nation and every race of human beings. The ancient lore of primitive peoples who, in some instances, live as far apart as India and North America, Greece and Mexico, contains traditions of such a catastrophe. There are likewise other sources than the Israelitish for the story of a " wise man " who saved himself and his family by building a vessel to float upon the waters. The Biblical record is remarkable, however, for the definite dimensions it enumerates for the construction of Noah's Ark.

We read in Genesis : *" The length of the ark shall be three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits."* The ancient Hebrew cubit—the length of a man's arm from the elbow to the extremity of the middle finger—is agreed to be about eighteen inches ; so that, on this basis, the Ark would be 450 feet in length, 75 feet in width, and 45 feet in height. . . . *"And in a cubit shalt thou finish it above."* From this it is concluded that the transverse section of the diluvian vessel was practically triangular, the two sides sloping from the rectangular base to within eighteen inches of meeting each other. This is represented diagramatically in the figure. (It is interesting to note that an ancient Phrygian coin has been found on which a crude representation of the Ark—*triangular* in aspect—is seen. This may or may not testify as to the actual shape of the vessel : certainly it shows how firm a hold the story of the Deluge had on the minds of the people in those early times).

The elementary principles of hydrostatics prove that such a vessel would be one of the most stable of floating bodies, but of greater significance is the *proportion* of the dimensions specified. A practical test of this was carried out as long ago as 1609 when a Dutchman, Peter Jansen, built a small ship in the exact proportions of the Ark. At the outset everyone laughed at this idea, but he kept steadily on. When his vessel was launched it was found that it could carry one third more cargo, and could sail faster than any other ship of the same dimensions—built in the ordinary way.

In this connection, it may be mentioned, that some years ago there appeared in a foreign journal an account of experiments carried out at a ship-building yard in Copenhagen. An eminent engineer was commissioned to build a vessel in the proportions of the dimensions given for Noah's Ark. After submitting the model to various tests he came to the conclusion that these proportions were the ideal requirements for any large vessel, and that they have not been superseded by better, even to this day.

It is well known that the relations between length, breadth and depth of a large vessel are of vital importance, not only to its stability afloat, but also to its structural strength. In general it may be said that the greater the length, the smoother the motion through the water. But increase in length—other things being equal—means a decrease in structural strength by a power higher than the square or even the cube of the increased elongation. Because of this it is easy to realise that the proportionate dimensions of a large ship have carefully to be compromised.

Noah's Ark, we may presume, was intended simply to be a floating vessel, without power of any kind. The experiments at Copenhagen revealed the significance of the sloping roofs. Such roofs would reduce to a minimum the combined action of wave and high wind, and the absence of any deck superstructure in such condition would promote further the comfort of those aboard.

Whatever be the true significance of the Biblical story of the Flood, we cannot but appreciate that for its special mission Noah's Ark must have been a masterpiece—it could not have been designed better to-day, even by a naval architect !

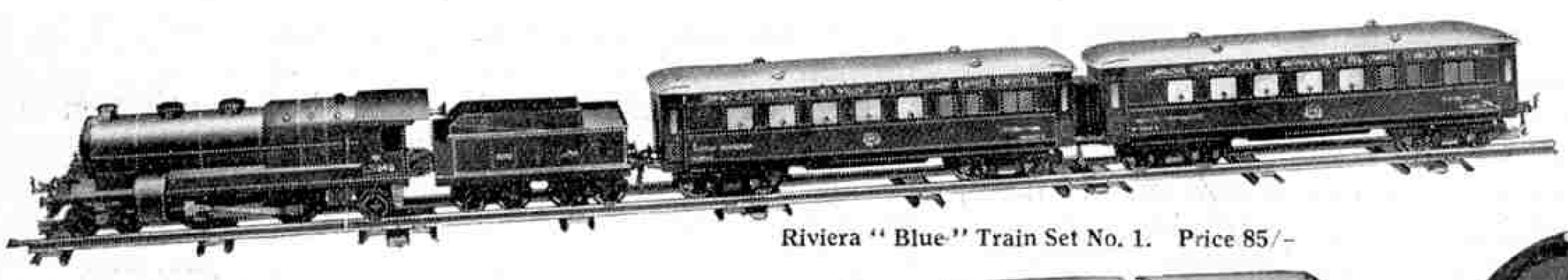
* * * * *

What became of this gigantic structure ? We are told that it rested on Ararat—a mountain in Armenia and Berossus, writing in the third century before the Christian era, said that the ruins were still to be seen there and that people treasured fragments of the wood as amulets and trinkets. A tradition amongst the Kurds and Syrians fixed the Ark's resting place on Mount Judi on the left bank of the Tigris. So strong indeed was this belief that a monastry and mosque of commemoration were built there which exhibited so called genuine relics of Noah's famous house-boat.

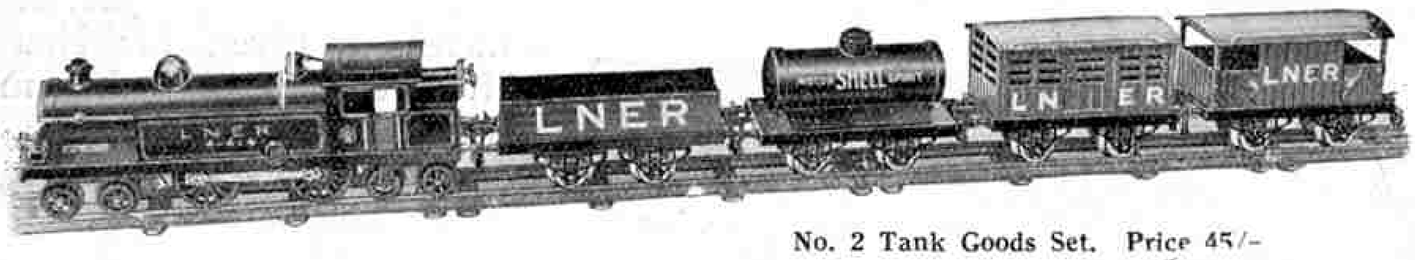
Who knows but that we may yet discover some of the pitched gopher wood, saved to tell its tale of an adventure so remarkable. Many wonderful instances are known of discoveries by modern excavators that have given substance to legends of a far more shadowy nature than the story of the Ark.



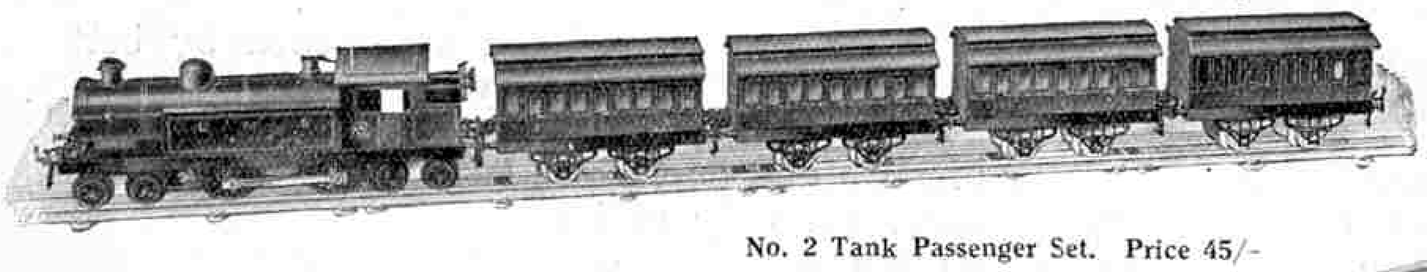
This is Hornb



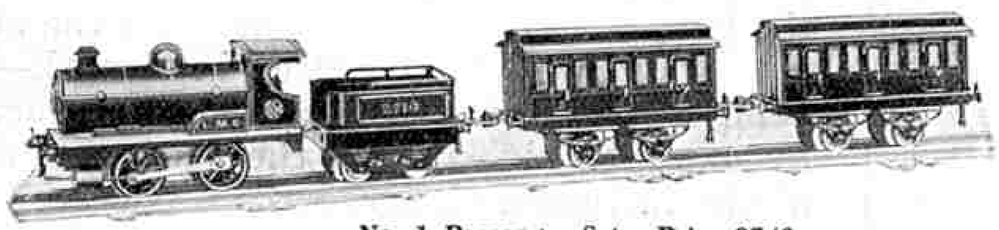
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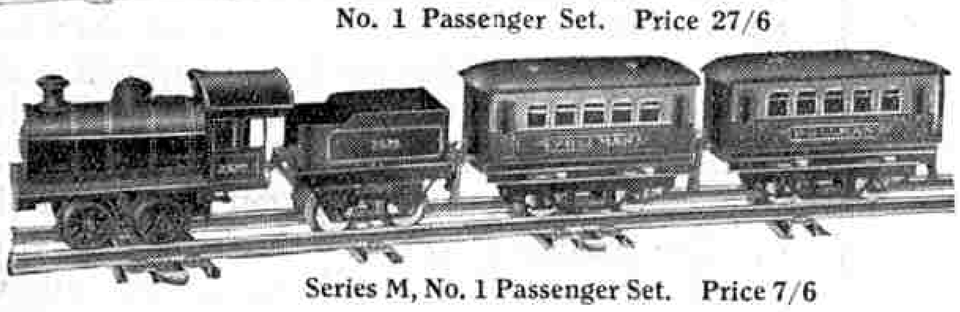
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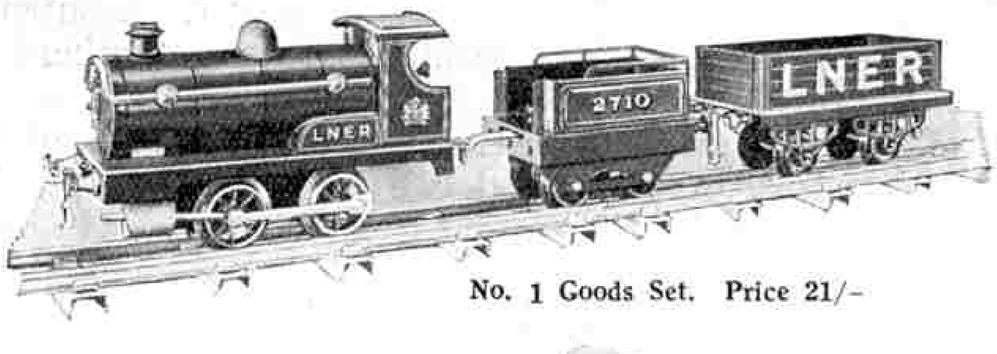
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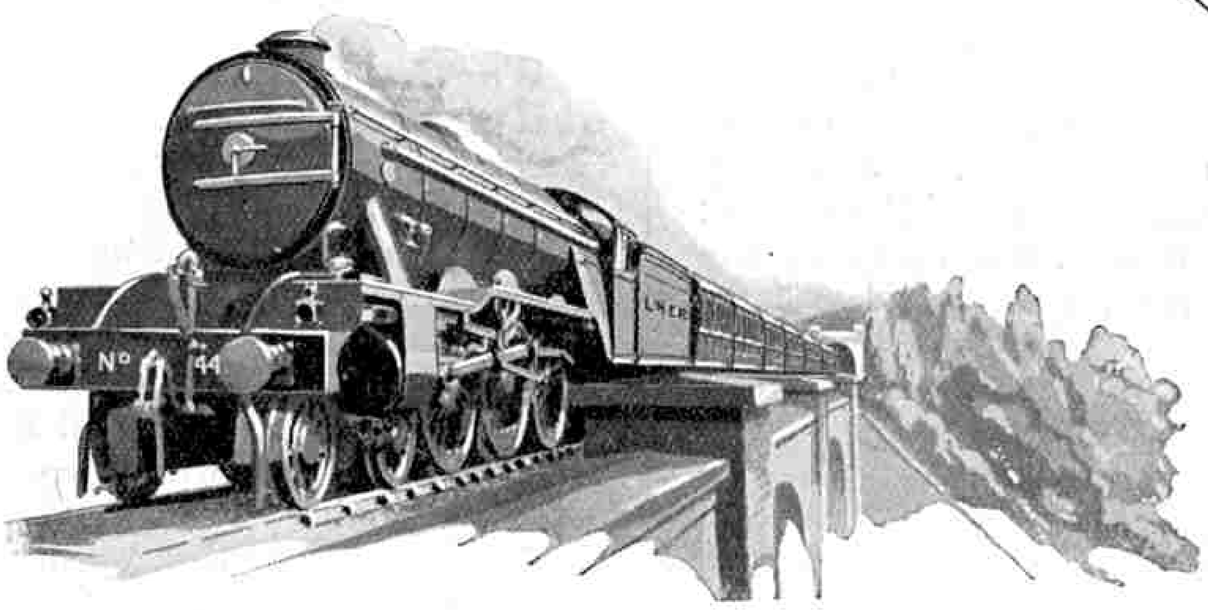
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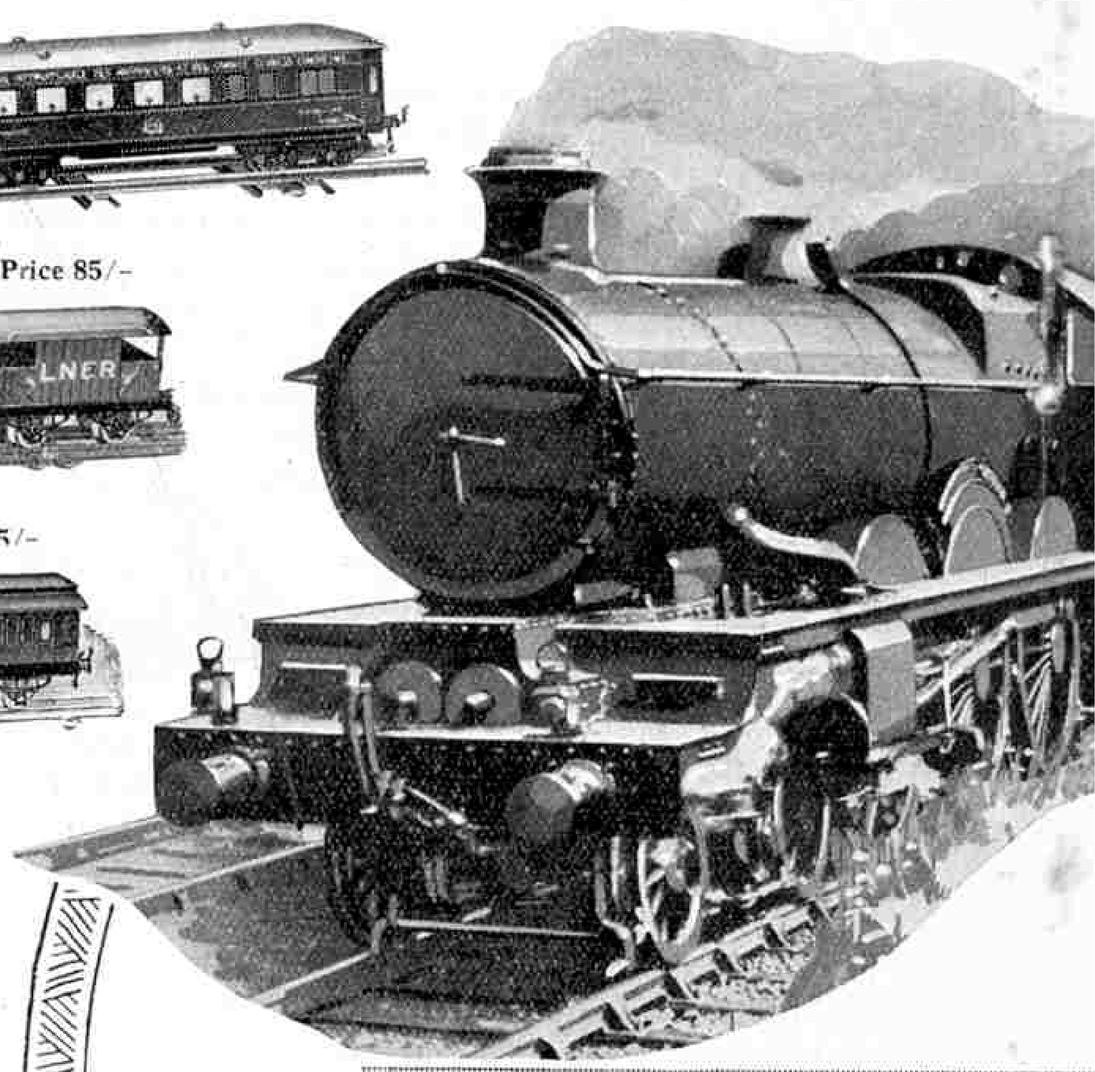


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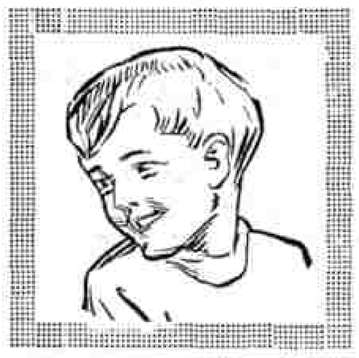
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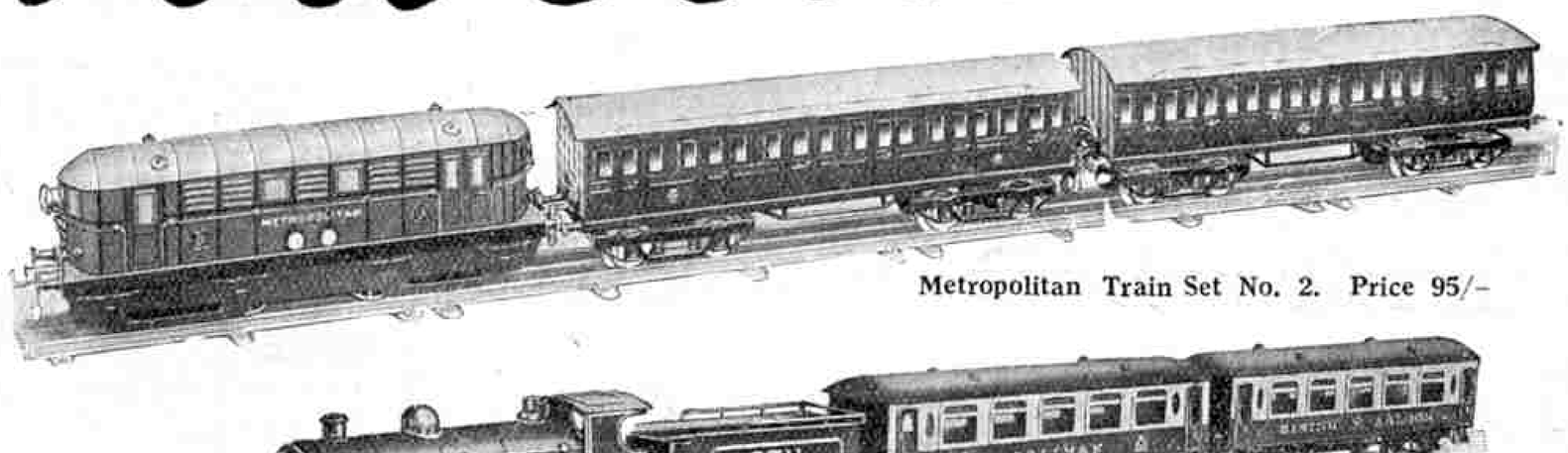
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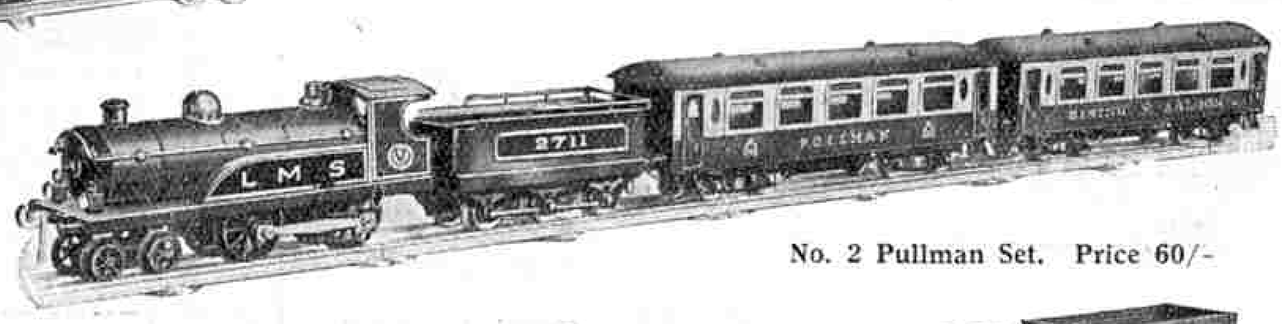
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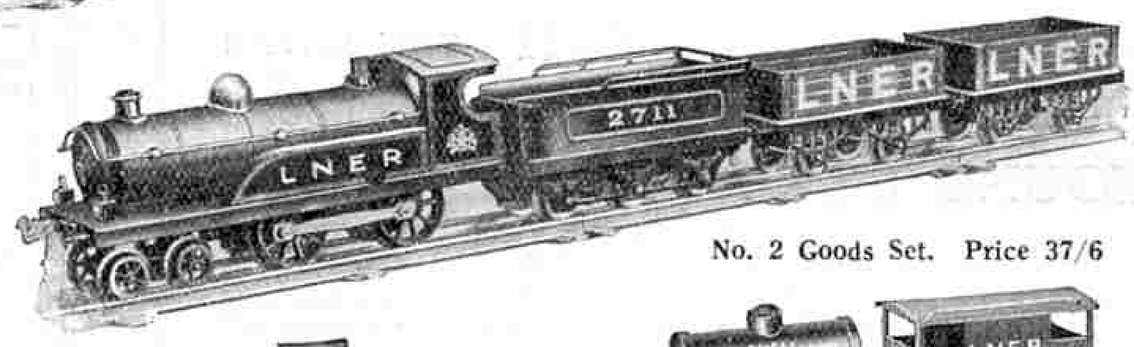
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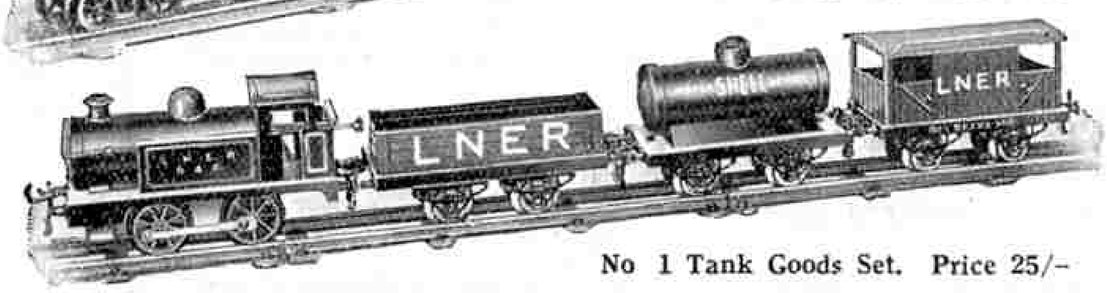
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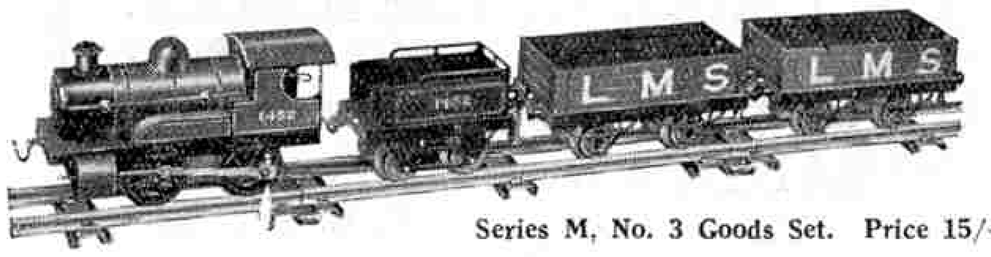
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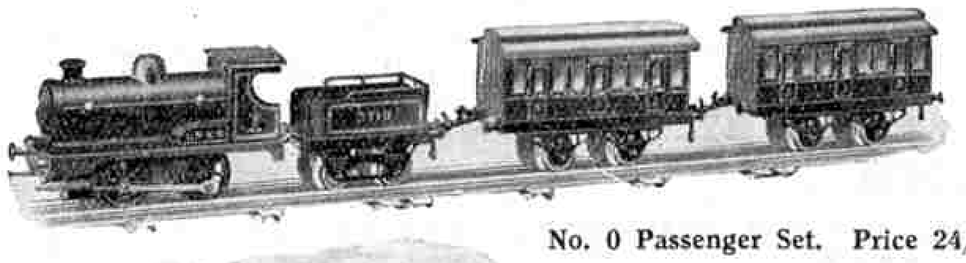
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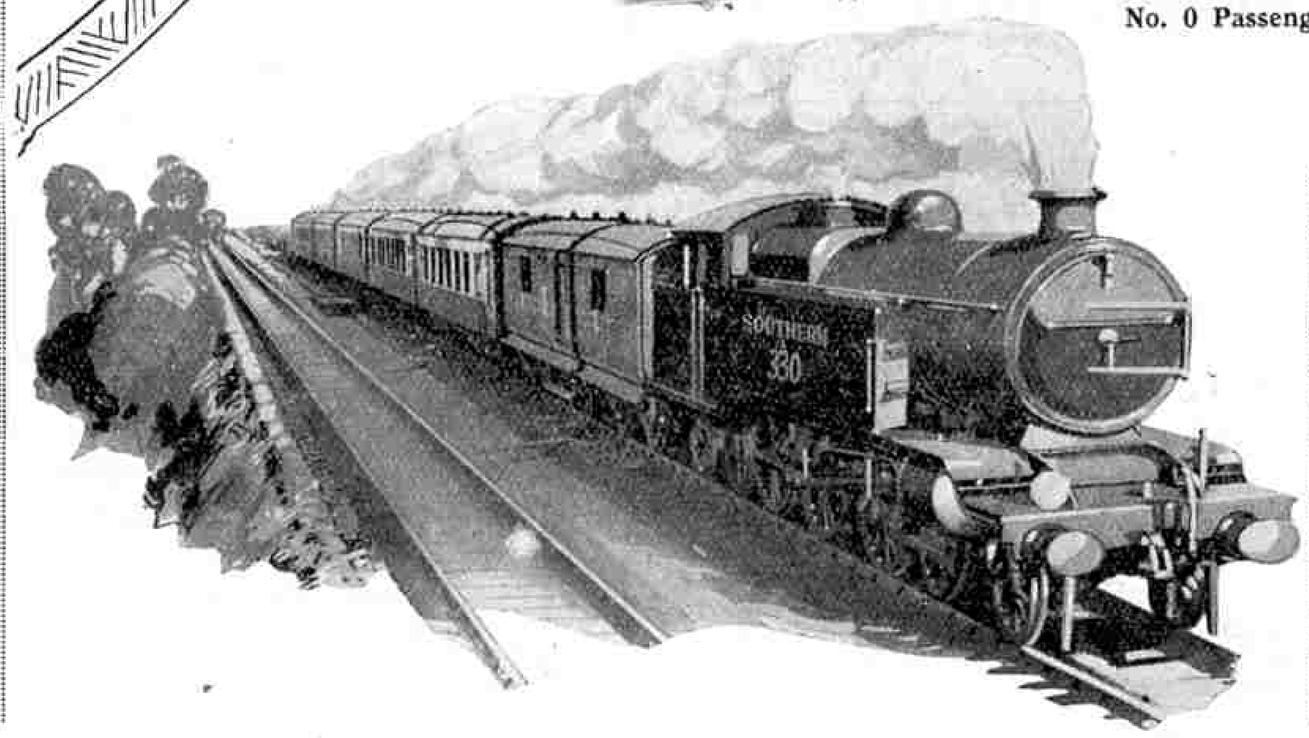
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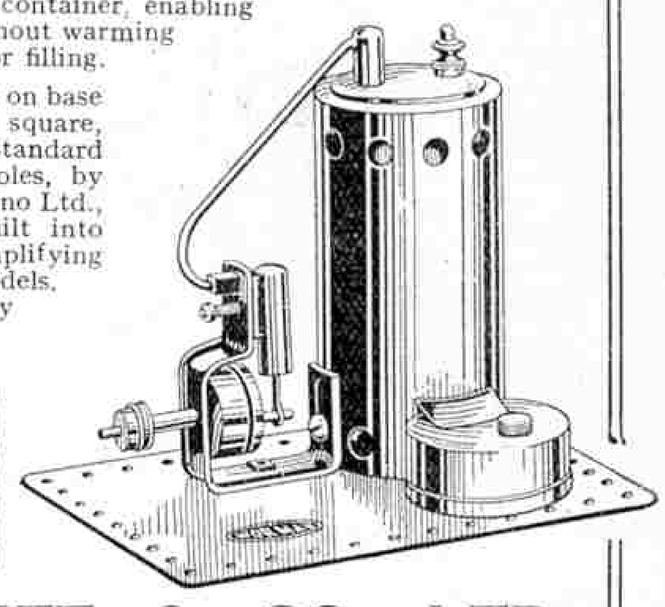
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By G. W. Greenland

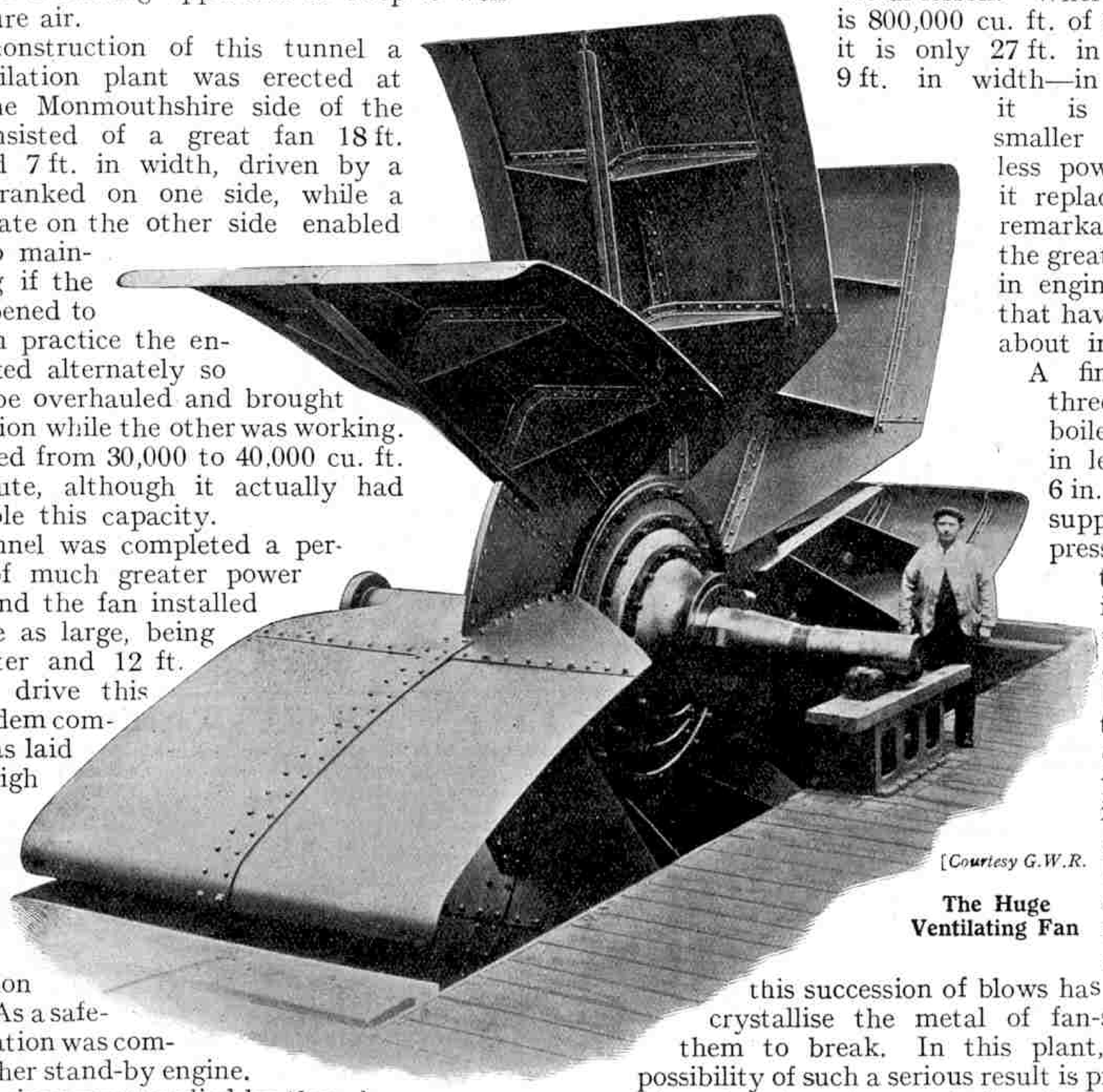
MANY thousands of people are whirled through the Severn Tunnel every day, but it is probable that few of these travellers ever give even a passing thought to the question of how this great under-water tube is ventilated. It is obvious, however, that a tunnel of such dimensions could not possibly be operated without adequate breathing apparatus to keep it well supplied with pure air.

During the construction of this tunnel a temporary ventilation plant was erected at Sudbrook on the Monmouthshire side of the river. This consisted of a great fan 18 ft. in diameter and 7 ft. in width, driven by a steam engine cranked on one side, while a stand-by duplicate on the other side enabled the engineers to maintain the fanning if the first engine happened to break down. In practice the engines were worked alternately so that one could be overhauled and brought to perfect condition while the other was working. This fan extracted from 30,000 to 40,000 cu. ft. of air per minute, although it actually had more than double this capacity.

When the tunnel was completed a permanent plant of much greater power was necessary and the fan installed was about twice as large, being 40 ft. in diameter and 12 ft. in width. To drive this giant a great tandem compound engine was laid down with a high pressure cylinder 25 in. in diameter and a low pressure cylinder 33 in. in diameter, having a common stroke of 30 in. As a safeguard the installation was completed with another stand-by engine. Steam for the engines was supplied by three large Lancashire boilers. For a continuous period of 38 years this mighty set of mechanical lungs kept the atmosphere in the celebrated tunnel pure and fresh.

In 1924 it was calculated that the life of the plant was about run. The traffic had increased to a vast extent and an enormously greater volume of air was now needed. Although no break-down had occurred it was decided to replace and modernise the equipment. Accordingly a new plant was designed and built up alongside the old unit, which continued its functions throughout the whole period of reconstruction. Massive new concrete foundations were put down and a small army of men attacked with vigour the task of providing the new breathing apparatus. New buildings rapidly arose to house the plant and quite an imposing looking structure grew up by the side of the Great Western main line.

The new fan, absolutely modern in design and provided with all the latest devices for economical running, teaches a very interesting and useful lesson. Whereas its capacity is 800,000 cu. ft. of air per minute, it is only 27 ft. in diameter and 9 ft. in width—in other words it is considerably smaller than the far less powerful fan that it replaces. This is a remarkable instance of the great improvements in engineering practice that have been brought about in recent years.



[*Courtesy G.W.R.*

The Huge Ventilating Fan

A fine battery of three Lancashire boilers, each 30 ft. in length and 8 ft. 6 in. in diameter, supply steam at a pressure of 150 lb. to the square inch and this steam is superheated to 500°F. In many fans trouble has been experienced through the immense stream of air being delivered really in a very rapid series of hammer blows, and this succession of blows has been known to crystallise the metal of fan-shafts, causing them to break. In this plant, however, the possibility of such a serious result is prevented by the provision of an ingenious anti-vibration shutter through which the air is delivered.

The engine is a tandem compound, its high pressure and low pressure cylinders having diameters of 21 in. and 42 in. respectively, with a common stroke of 39 in. Here again modern engineering has produced an engine very little larger than its predecessor but far more powerful.

Before bringing this latest breathing apparatus into actual operation, the railway engineers insisted upon a number of very stringent tests being carried out with extreme care. These tests were satisfactory and the plant is now working away steadily in its huge housing at Sudbrook. It is probable that many years will elapse before it is superseded by some even mightier giant.

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WHAT YOU HAVE TO DO

By carefully following the instructions given below, you can produce a very clever sketch of the famous MECCANO boy. All you have to do is to draw a number of lines on the accompanying chart.

Remember that, unless a CORNER is mentioned, the lines are to be drawn to the CENTRE of a square. You can find the particular square by referring to the row and column. Thus—A1 is the first square on the chart; G6 is the sixth from the left on row G, and so on. NOTE THIS:—The word "From" denotes the START OF A FRESH LINE.

It is advisable to lightly pencil in the lines first and complete the drawing carefully in ink. Fill in the coupon (in capital letters), cut out the whole page, and post, accompanied by a SIXPENNY POSTAL ORDER, to the address on the coupon. P.O.'s should be made payable to ERN SHAW, HULL, and crossed "& Co."

Entries must arrive not later than Jan. 1st, 1927

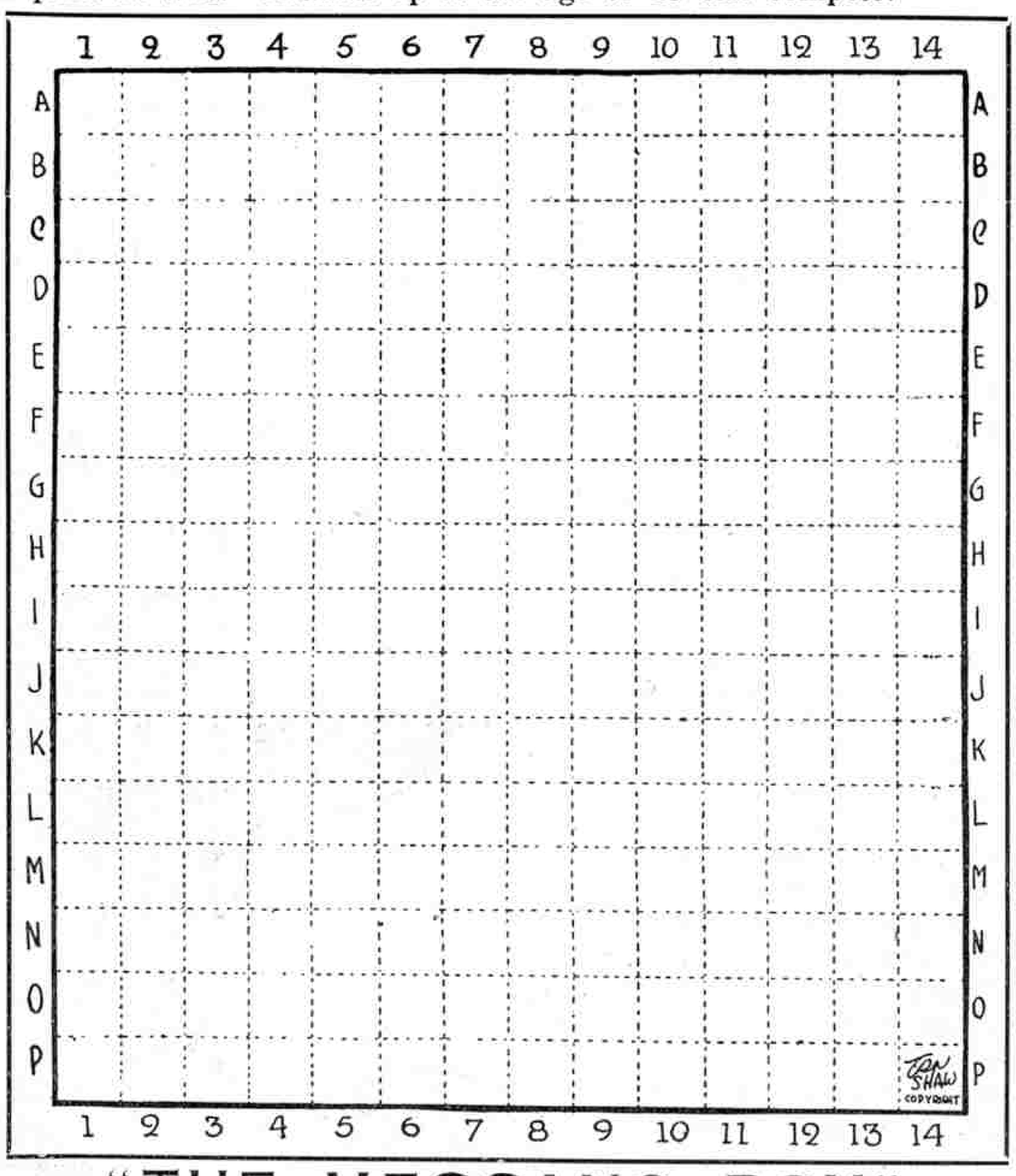
SPECIAL NOTE You may submit as many entries as you like, **provided a 6d. P.O. accompanies each.** Where extra copies of the "*M.M.*" are not available, and in the case of readers not wishing to mutilate their Magazine, competitors may submit entries on "home made" charts. Draw a square 7" × 7" and divide it into half inches. Mark it with the letters and numbers, using the chart on this page as a guide. This will enable several members of one family to compete. Please write Name, Address and Age plainly on each entry

Meccano Club Secretaries are kindly requested to draw the attention of their members to this competition.

The entries will be judged by "Uncle Ern," the popular Wireless Cartoonist of 6KH, who will submit a selection of the best drawings to the Editor of "MECCANO MAGAZINE," who has kindly consented to act as the final judge. His decision must be accepted as legally binding, and competitors, by entering, accept this condition. No correspondence can be entered into

PRIZES WILL BE DESPATCHED TO THE WINNERS BY THE EDITOR OF THE "MECCANO MAGAZINE," and their names and the correct drawing will be published in the February issue.

SEND YOUR ENTRIES EARLY.



"THE MECCANO BOY"

Place your pencil in the centre of B9 and draw a continuous line through the following squares. Remember the word "FROM" means, begin a FRESH LINE.

FROM
B9 to D7
D7 to F4
F4 to E4
E4 to G2
G2 to E2
E2 to B4
B4 to A6
A6 to A10
A10 to B12
B12 to C13
C13 to bottom right corner of E13 to centre of F13
FROM
B9 to D8
D8 to E8
E8 to G10
G10 to top right corner of G11
FROM
Top left corner of G3 to centre of H3 to bottom left corner of I.3 to centre of K3
K3 to M4
M4 to N5
N5 to N7
N7 to L11
L11 to top right corner of J11 to centre of J12—J12 to top right corner of H13 to centre of F13
F13 to F12
F12 to G11
G11 to G12
G12 to top right corner of G12 to centre of G13
G13 to I.12
FROM
Bottom right corner of P7 to centre of O6
O6 to N6
N6 to bottom left corner of P5 to centre of O6
O6 to M11
M11 to L12
L12 to M13
M13 to bottom right corner of O14, Bottom right corner of O14 to bottom leftcornerof P9
FROM
J12 to L12
FROM
H3 to top right corner of H3
FROM
H5 to bottom left corner of I.5 to centre of J5 to top right corner of J6
FROM
I. 6 to bottom right corner of J7 to centre of L8
FROM
Top right corner of J4 to bottom left corner of J4 to centre of L4
FROM
Top left corner of K4 to centre of K5
K5 to K6
K6 to top right corner of K7 to centre of L6
L6 to L5
L5 to top left corner of K4
FROM
Bottom left corner of K5 to bottom right corner of K6
FROM
H7 to top right corner of H7
THICKER LINES.
FROM
G3 to G4
G4 to H5
FROM
G6 to G8
G8 to H9
Now find square H4. Outline this, then divide it into four Quarters, shading in all except the top left quarter. Do exactly the same with Square H8. Shade portions of the mouth in squares L5 and L6.
To suggest check collar, shade portions in squares: M11 and M13, N8,N10 and N12, O6, O7, O9, O11, and O13, P5, P8, P10 and P12.

Note: Carefully Check over your Pencilled Version before completing the Drawing in Ink.

Complete the drawing in ink, enclosing 6d. P.O. crossed "& Co." Write name and address in BLOCK LETTERS.

Name..... Address.....

..... Age.....

Post to:—UNCLE ERN., HASSALL HOUSE, VICTORIA AVE., HULL.
To arrive not later than first post Jan. 1st, 1927

Competition Page

Hidden Proverbs

The weird collection of symbols depicted in the drawing above is not, as might well be imagined, the outcome of a convivial evening in which our compositors took part. In actual fact, each of the four rows conceals a well-known proverb.

The peculiar arrangement of the "code" is not due to any alteration of the order of the words and letters and these will be found to be in the precise order in which they appear in the proverb. What really has happened is that various portions of each letter have been blotted out. That clue should prove sufficient to enable our readers to discover the identity of each proverb.

Prizes of Meccano Goods to the value of 15/–, 10/6 and 5/– respectively will be awarded to the best three sets of solutions and in addition there will be a number of consolation prizes, value 2/6 each.

Solutions must be addressed to "Hidden Proverbs, Meccano Magazine, Binns Road, Liverpool" and sent to reach this office not later than 31st December. Overseas closing date, 31st March, 1927.

20th Drawing Contests

Railway subjects have always proved to be very popular drawing subjects with our readers, as was shown by the heavy entries in the January and September contests last year when the subjects respectively were, "A Locomotive" and "A Train in Motion."

This month we will take "A Railway Scene" as the subject and, as the scope permits the introduction of everything and anything connected with railway working, we anticipate a record entry. It is hardly necessary to give any hints as to points in railway working that would provide material for drawings, but in order that there may be no misapprehension we make it quite clear that drawings of locomotives or trains may be sent in. On the other hand, signal gantries, stations, signal boxes, platelayers at work on the track, shunting in progress, all provide suitable scenes.

Competitors will be divided, as usual, into two groups, A, those aged 16 and over, and B, those under 16. Prizes of artists' materials or Meccano goods (to be chosen by the winners) to the value of 10/6 and 5/– respectively will be awarded to the first and second prize winners in each section, in addition to a number of consolation prizes of the value of 2/6. Each entry must bear the name, age, and address of the competitor and should be forwarded to "20th Drawing Contest, Meccano Magazine, Binns Road, Liverpool." Closing date, 31st December. Overseas, 31st March, 1927.

Competitors who wish to have their drawings returned to them must enclose a stamped addressed wrapper for that purpose when forwarding the drawings for competition.

Home Results

Limericks Contest

It has long been a charge, laid against us by foreign friends, that the vagaries of the English system of pronouncing words make the language one of the hardest to learn, and one of the mildest complaints is that the system is inconsistent. After judging this contest, we are prepared to go further. It is weird. We hardly believed it possible that so many words spelt differently could be pronounced alike. But perhaps the Briton's famous sense of humour is the outcome of his trials with his mother tongue. At any rate, the entries to this contest showed many highly ingenious twists of fun.

A considerable proportion of the Limericks submitted were really funny and although many were "chestnuts," it was encouraging to find some new ones. Incidentally we discovered a new rhyme for Meccano!

It was very difficult to decide to which entries the prizes should be awarded, owing to the high standard of merit. The following were the successful competitors:—1. R. S. Coulthard (Liverpool); 2. F. Moore (Aughton, Nr. Ormskirk); 3. G. Fowles (Wem, Salop).

Consolation prizes, value 2/6 each, were awarded to the following:—E. J. Boorman (Chatham); C. W. Burman (Fleetwood); G. W. Coxhead (Wanstead, E.11); L. F. Gilbert (Portsmouth); G. S. Marsh (Blackpool); S. Riley (Stowmarket); D. Phipps (Nottingham); H. Woodward (Birmingham).

18th Drawing Contest

The general level of merit of the drawings for this competition, the subject of which was "A Racing Motor Car," was extremely good and this fact, coupled with an unusually large volume of entries, made the task of judging none too easy. Quite a number of paintings and pastel drawings were submitted although, of course, the majority of the competitors confined their efforts to straight black and white pencil work.

Prizes were awarded to the following:—First Prizes: Section A, John Milner (Leeds?); Section B, H. Lane (Stokesley, Yorks.). Second Prizes: Section A, N. Edgar (Blaydon-on-Tyne); Section B, A. Smith (Nuneaton).

Consolation Prizes, value 2/6 each, were awarded as follows:—Section A, H. Cummings (Paignton); C. Graham (Plymouth); F. Herriot (Peebles); J. P. Renee (Eltham, Kent); R. V. Smith (Eltham, S.E.9). Section B, A. Cuckson (Gainsborough); D. Malpas (Boscombe, Hants.); E. B. Stott (Mill Hill, N.W.7); A. Troughton (Lancaster).

October Essay

There was an exceptionally large entry for this contest, the subject of which was "My Favourite Cover," and as was to be expected, opinions differed very widely. The October 1926 cover, depicting the motor ship "*Gripsholm*," probably had the largest number of admirers but was closely followed by the covers for February, April and August of this year. The prizes were awarded as follows:—First Prizes: Section A, V. J. Ruxton (Kirkcaldy); Section B, L. Thomas (Yeovil). Second Prizes: Section A, W. G. Ainslie (Bo'ness, West Lothian); Section B, F. G. Kay (Gerrard's Cross).

Overseas Results

"From My Window" Essay

First Prizes: Section A, T. McKelvie (Auckland, N.Z.); Section B, C. E. Hogg (Oamaru, N.Z.) Second Prizes: Section A, F. Dawson (Takapuna, N.Z.); Section B, R. Trotter (Sydney, N.S.W.)

15th Drawing Contest

First Prizes: Section A, J. Scheer (Holland); Section B, D. Shores (Winnipeg); Second Prizes: Section A, V. W. Halpe (Ceylon); Section B, L. Pezzoni (Buenos Aires).

27th Photo Contest

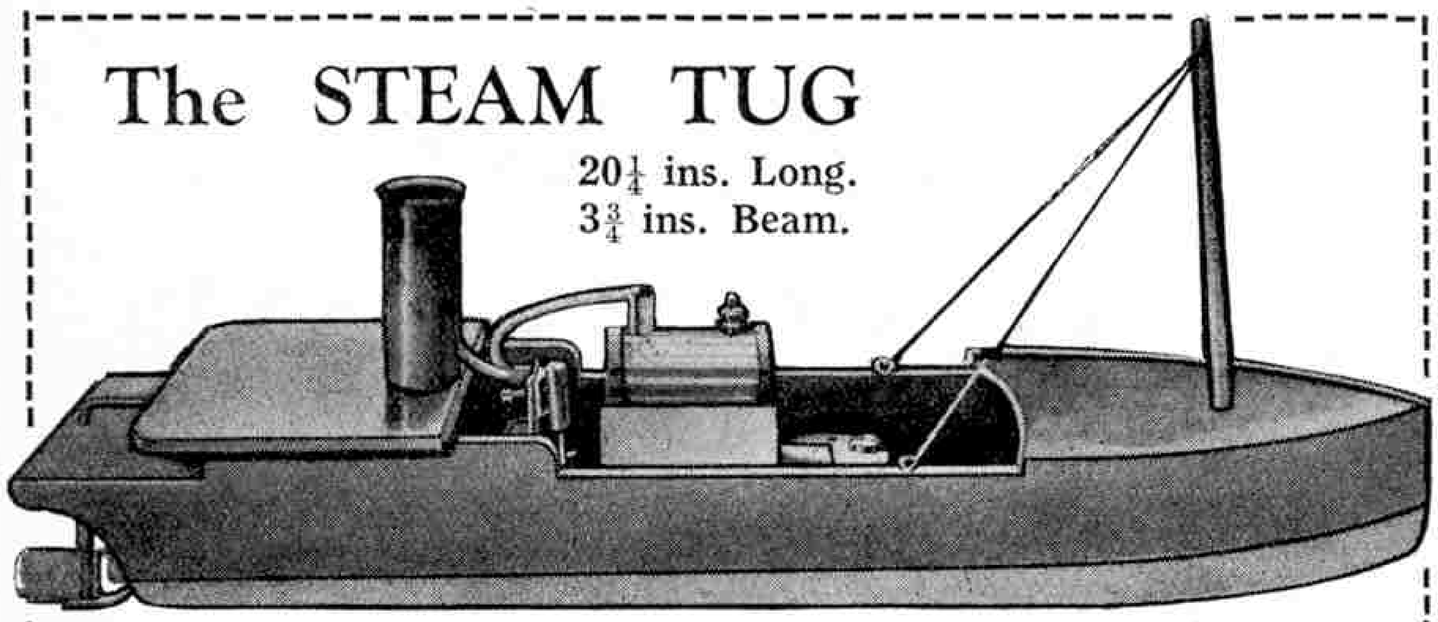
First Prizes: Section A, M. B. Johnson (Sydney, N.S.W.); Section B, J. Ellis (Montreal). Second Prizes: Section A, Lee Ee Ngee (Singapore); Section B, T. C. Meng (Singapore).

WHO SAYS A MODEL LAUNCH?

Just the Thing for a Christmas Present

The STEAM TUG

$20\frac{1}{4}$ ins. Long.
$3\frac{3}{4}$ ins. Beam.



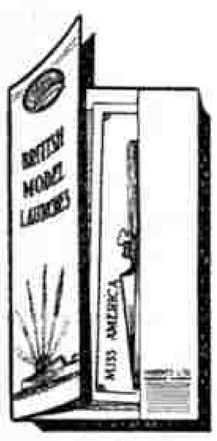
Here's something quite new—a tug-boat realistically fitted with funnel and mast. The exhaust of the engine escapes through the former, and gives off every appearance of smoke as the boat churns her way along. Hull finished in two colours and with raised main deck abaft the engine. The funnel and mast are detachable for packing.

11/9
Postage 9d.

HOBBIES STEAM MODELS

SAFE, SMART AND SPEEDY

Filler, Lamp, and full instructions supplied



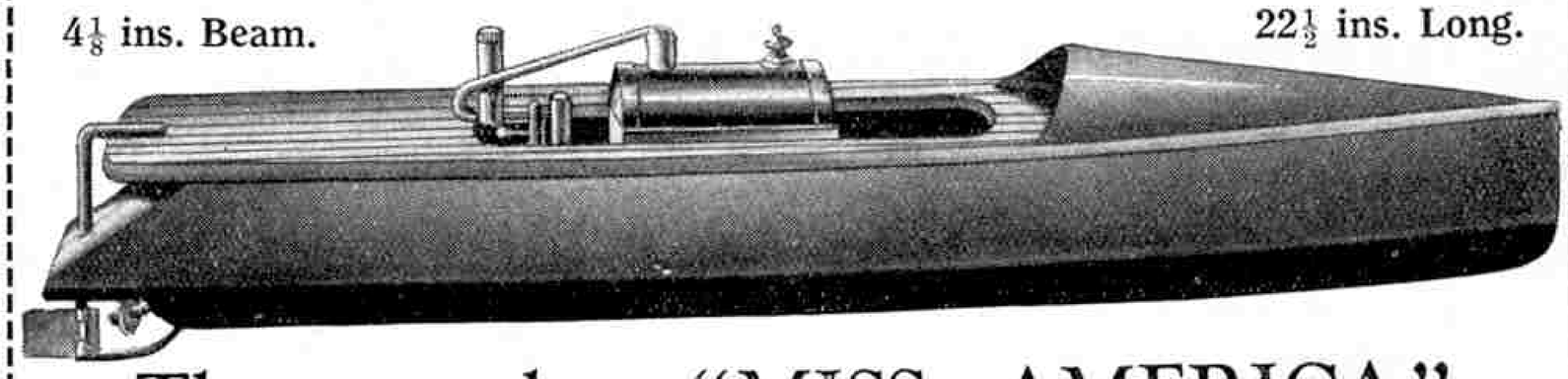
Write for this Wallet

An interesting wallet of these launches and of sailing boats and stationary engines will be sent free to any reader writing to Dereham as below or by calling at any branch.

NOTHING CAN COMPARE FOR PRICE AND VALUE

$4\frac{1}{8}$ ins. Beam.

$22\frac{1}{2}$ ins. Long.



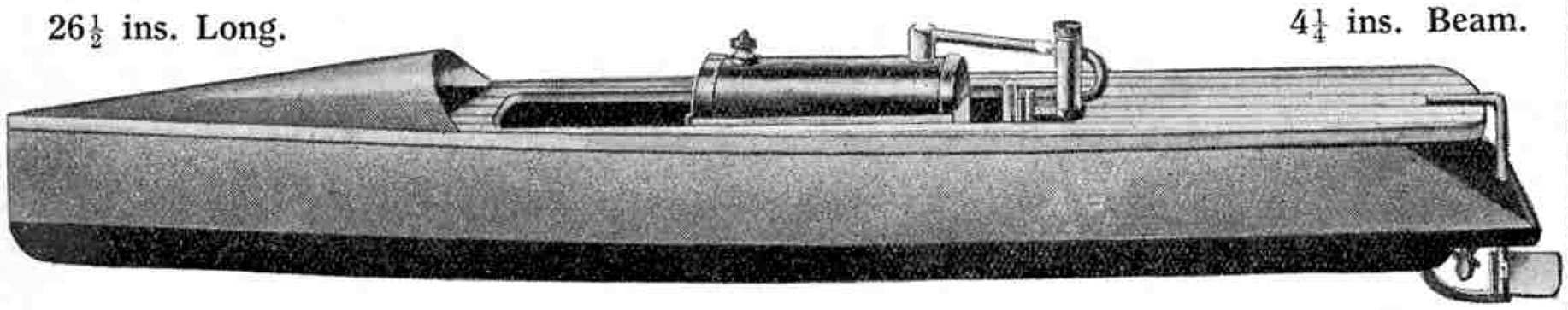
The popular "MISS AMERICA"

A splendid boat for speed and beauty. The hull is finished in two colours, and the deck lined for planking. A big head of steam is soon raised, and twenty minutes' steady running follows. A new feature is the automatic grease lubricator which gives greatly increased power and speed.

12/6
Postage 9d.

$26\frac{1}{2}$ ins. Long.

$4\frac{1}{4}$ ins. Beam.



The speedy launch "PEGGY"

A greatly improved boat with large boiler and firebox. The boat is long and shapely, but the strong engine drives it nearly half-an-hour at one filling. A grease lubricator is added for speed and power. The rudder can be set to any direction. The hull is finished two colours of enamel and is a striking picture on any lake.

22/6
Postage 9d.

All models cut from the solid and fitted with new pattern lamp and safety valve.

OTHER MODELS
10/6 & 30/-

Readers Abroad
Readers overseas can order by post as export orders are dealt with by expert packers. Postages 4/- for the Tug and 4/9 for the other two.

Obtainable from Gamages, Harrod's, Whiteley's, Hamley's, Barker's, and all stores or fancy goods shops. Or from Hobbies Branches at 65, New Oxford St., W.C.—79, Walworth Rd., S.E.—326, Argyle St., Glasgow—10a, Piccadilly, Manchester—9a, High St., Birmingham—214, West St., Sheffield—89a, Woodhouse Lane, Leeds—25, Bernard St., Southampton—68, London Rd., Brighton. Also direct (post extra) from

HOBBIES LTD. (Dept. 296) - - DEREHAM - - NORFOLK

Canadian Store: 45, COLBORNE ST., TORONTO, ONTARIO

Special
Model-Building Competition
FOR MODELS BUILT WITH THE NEW MECCANO



How the Prizes will be Won

IN this competition, which forms the second of the present winter series, special consideration will be given to models that display to advantage the new coloured parts of the New Meccano.

Models possessing originality and general constructional merit will be selected from the competition entries and will be assembled at the offices of Meccano Ltd. The final allocation of awards will then be made by placing in order of merit those models that, in the judges opinion, display the most pleasing appearance on account of the artistic skill with which the coloured parts have been employed in their construction.

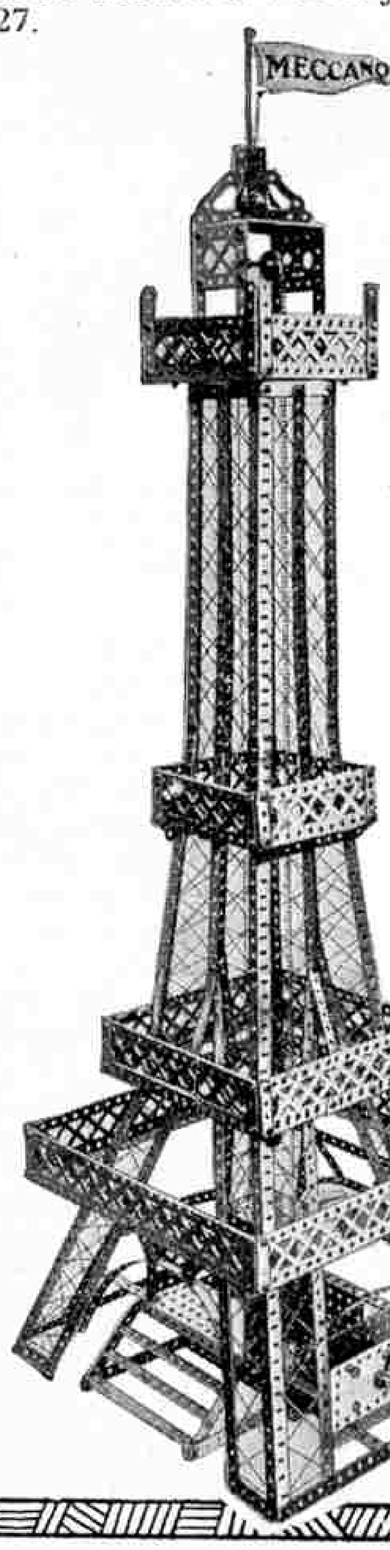
We may remind readers that the enamelled parts now obtainable are as follows :—Red ; all Plates, and Accessory Parts Nos. 41, 61, 108, 109, 118, 119, 126, 126a, 131, 133, 138, 139, 139a, 143, 145, and 146. Green ; Braced Girders, all sizes, and 2½" Curved Strips (small radius).

It is a perfectly simple matter to participate in these competitions, for no entry forms or fees are necessary. The contests are organised with the two-fold object of helping our readers to derive the best possible fun from their Meccano Outfits, and to provide an incentive for their inventive abilities.

Competitors should remember that in this competition the following points will weigh heavily in their favour : (a) Originality of ideas—as expressed by the type of apparatus selected as the subject of the model, or by the novel uses of Meccano parts or movements employed therein: (b) general constructional merit ; and (c) artistic ability and sense of proportion displayed in the employment of the new coloured Meccano parts.

Closing Dates

Entries for Sections A, B and C must be received at the Meccano offices not later than 25th January, 1927. Closing date for Section D : 30th June, 1927.



FOUR SECTIONS

Entries in this Competition will be divided into the following Sections :—

Section A : for Competitors over 16 years of age.
Section B : for Competitors over 12 and under 16 years of age.
Section C : for Competitors under 12 years of age.
Section D : for Competitors residing outside the United Kingdom.

LIST OF PRIZES

The following prizes will be awarded for the best models received IN EACH OF THE THREE SECTIONS A, B AND D :

First Prize : cheque for £3-3s.
Second Prize : „ £2-2s.
Third Prize : „ £1-1s.

Six Prizes, each of Meccano Products to value of half a guinea.

Certificates of Merit and complimentary copies of "Meccano Standard Mechanisms."

The Prizes in SECTION C are as follows :—

First Prize : Meccano Products to value £2-2s.
Second Prize : „ „ £1-1s.
Third Prize : „ „ 10/6

Six Prizes, each of Meccano Products to value 7/6.

Certificates of Merit and complimentary copies of "Meccano Standard Mechanisms."

Important

Having read carefully all the particulars given on this page, readers should send in clear photographs or good drawings of their models, together with any explanations that may be necessary, although the latter should be made as brief as possible.

The following instructions must be followed closely. The competitor's name and address must appear on the back of each photograph or sheet of paper used, together with his age, name of the competition ("New Meccano" Competition), and section in which the model is entered. Envelopes should be addressed "New Meccano" Competition, Meccano Ltd., Binns Road, Liverpool.

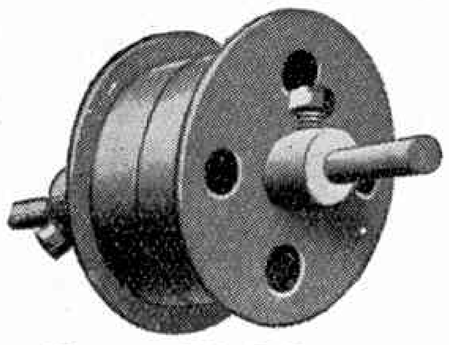
It is not necessary for readers to indicate in any special manner the coloured parts used in their entries, as our model-building staff will insert the new parts in the models wherever they appear in the drawings or photographs.

Equal Opportunities for Boys of all Ages

Any type of model may be submitted in the competition providing it is the competitor's own unaided work, both in design and construction. No restriction is enforced as to the size of Outfit or quantity of parts that may be used, but it is important to remember that it is not necessarily the most intricate or elaborately-constructed models that will carry off the prizes.

It will be observed from the particulars given in the centre of the page that entries received from readers residing in the British Isles will be divided into three Sections, according to the competitors' ages. The object of this arrangement is to ensure that every competitor will be called upon to compete only with the work of boys of approximately the same age as himself. It was not considered necessary to divide the Overseas Section in the same manner, but in this section also the age of the competitors will be taken into careful consideration by the judges.

Actual models should not be sent. A clear photograph or good drawing is all that is necessary. Photographs or drawings of unsuccessful contributions will be returned if desired, providing a stamped addressed envelope of the necessary size is enclosed with the entry, but it should be noted that photographs of prize-winning models become the property of Meccano Ltd.



Meccano Belt Pulley, constructed from two Flanged Wheels

Suggestions Section

Edited by "Spanner"

(66)—Miniature Electric Washing Machine

(Carl W. Beese, Hamilton, Ont., Canada)

WE have published at different times some very interesting suggestions received from C. W. Beese, and this month we are pleased to be able to illustrate an excellent model of an electrically-driven clothes-washing machine that he constructed almost entirely from Meccano parts.

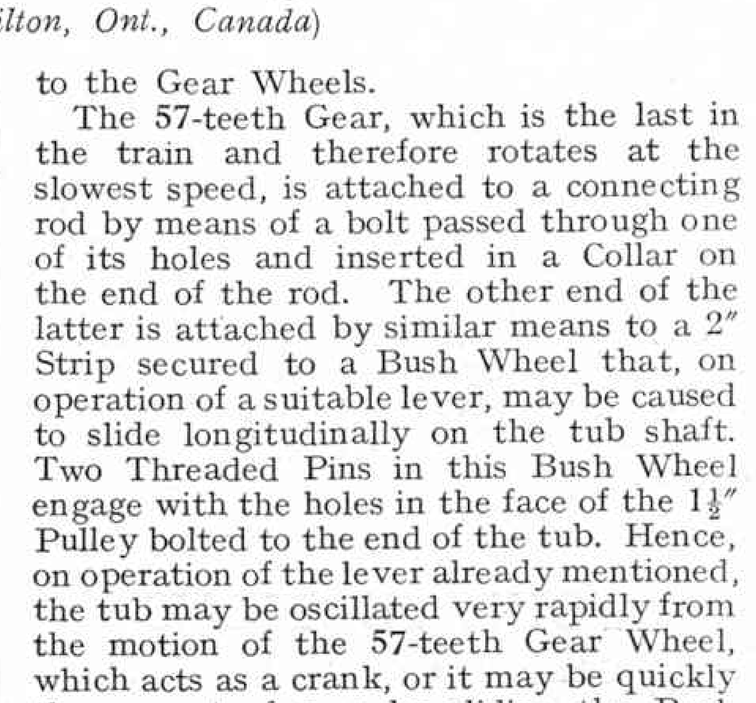
Some time ago our contributor's father, the Rev. W. E. Beese, purchased a Coffield Washing Machine from the Hamilton Hydro commission, and exactly one week later his son had completed the model and it was on exhibition in the offices of the commission. The model is a very good representation of the Coffield machine and it was described by Mr. W. H. Childs, secretary and manager of the Hamilton Hydro commission, as "a wonderful piece of work!"

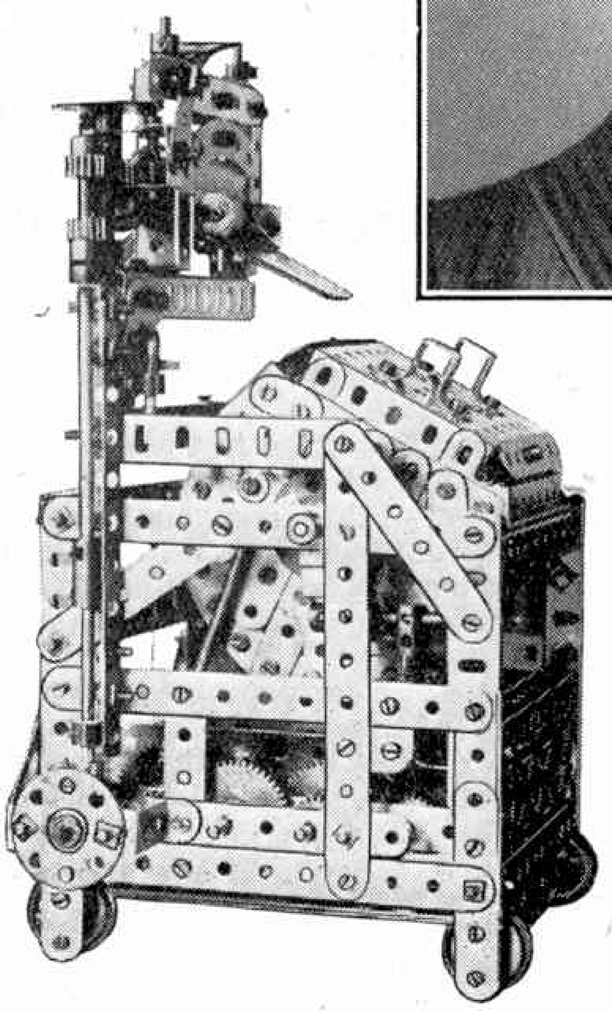
Each end of the tub in the model is made up of two pairs of $2\frac{1}{2}''$ Curved Strips, each pair being overlapped one hole and joined at the top to the other by means of a $3\frac{1}{2}''$ Strip. From the central hole of the latter another $3\frac{1}{2}''$ Strip runs down to the point where the two pairs of Curved Strips meet at the bottom of the tub.

The tub is supported on a $1''$ Rod at one end and a $2''$ Rod at the other; these Rods are held in the bosses of $1\frac{1}{2}''$ Pulley Wheels bolted to the tub ends. Proper balance is obtained by weighting the top of either side of the tub with a number of $2\frac{1}{2}''$ Strips, secured on the inside. A $\frac{1}{2}''$ rubber band takes the place of the "kick spring" and brings the tub to rest when the clutch is disengaged; one end is attached to the bottom of the tub and the other to the frame directly under the tub bearing.

As in the actual Coffield machine, the drive is led to gearing arranged on the left of the tub, and the speed of the shaft that takes the belt drive from the motor is reduced through a gear train consisting of two $\frac{3}{4}''$ Pinions, two 50-teeth Gear Wheels, one $\frac{1}{2}''$ Pinion and one 57-teeth Gear Wheel. In each case the Pinions drive on to the Gear Wheels.

The 57-teeth Gear, which is the last in the train and therefore rotates at the slowest speed, is attached to a connecting rod by means of a bolt passed through one of its holes and inserted in a Collar on the end of the rod. The other end of the latter is attached by similar means to a $2''$ Strip secured to a Bush Wheel that, on operation of a suitable lever, may be caused to slide longitudinally on the tub shaft. Two Threaded Pins in this Bush Wheel engage with the holes in the face of the $1\frac{1}{2}''$ Pulley bolted to the end of the tub. Hence, on operation of the lever already mentioned, the tub may be oscillated very rapidly from the motion of the 57-teeth Gear Wheel, which acts as a crank, or it may be quickly thrown out of gear by sliding the Bush Wheel so that the Threaded Pins are without-



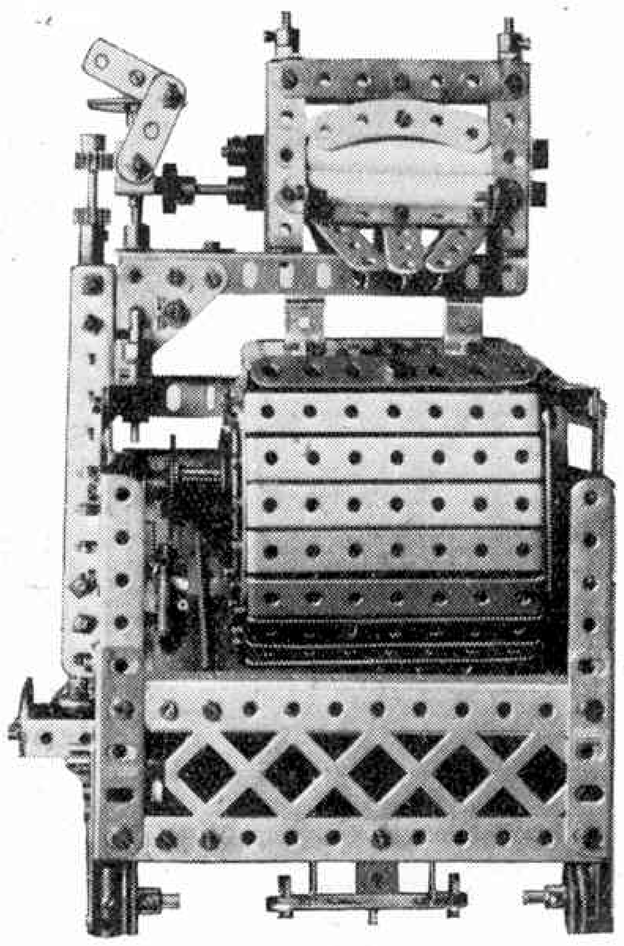


drawn from the Pulley.

A $\frac{1}{2}''$ Pinion on the shaft of the 57-teeth Gear Wheel transmits motion to a $\frac{3}{4}''$ Contrate Wheel secured to a vertical Rod leading up to the wringer mechanism. This Rod can be seen in the illustration.

The wringer is driven forward, stopped and reversed by manipulating the lever (a $1\frac{1}{2}''$ Strip) shown in the upper illustration. If this lever is placed in a vertical position the wringer runs in a direction away from the operator; if at an angle of 45 degrees it stops; and if in the horizontal position the motion of the rollers is reversed. The $1\frac{1}{2}''$ Strip is pivoted to a Threaded Boss mounted on a Bush Wheel secured at the top of the wringer supporting-rod.

A $\frac{3}{4}''$ Pinion slides on this rod and takes the drive from $\frac{1}{2}''$ Pinions on the wringer power shaft. Its movement is controlled by



Centre: Carl W. Beese, who constructed the Meccano Washing Machine. Above: general view of the model. Below: side view, showing gearing

means of a fork made from a Double Angle Bracket with a Flat Bracket bolted to each end, with the slotted holes engaging the rod. The space in the fork above the Pinion is filled with Washers to take up the play. This $\frac{3}{4}''$ Pinion meshes with a small Contrate Wheel on the lower wringer roller shaft, and the reversing is accomplished by presenting the drive either to the top or bottom of the Contrate.

The wringer is built up on a $5\frac{1}{2}''$ Angle Girder, and the uprights forming bearings for the rollers each consist of three $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The construction of the double drip board is clearly shown in the photographs. The rollers consist of paper tightly wound on the rods and are held in place by crowding a Collar and set-screw tightly against each end. They should be of such thickness that they barely touch when assembled; the wringer will then take strips of cloth cut in $2''$ widths in fine style.

It is interesting to note that the actual machine runs at approximately 90 oscillations of the tub per minute.

Novel "Suggestions" Competition

VOTES WANTED

It is now fourteen months since the "Suggestions Section" was first inaugurated. During that period it has grown in popularity to an extraordinary extent, and it has proved an increasingly difficult task to select from the hosts of contributions received three or four for publication each month. In this connection we believe it would be no easy matter to decide which were the best suggestions published during the present year, and in order to discover our readers' opinions on the matter we have decided to run a Voting Competition.

In this competition readers are asked to write down in order of merit the four suggestions that they consider to be the best published in this Section during the twelve months January to December, 1926. It should be noted that of the twelve issues of the Magazine concerned, only two appeared without the "Suggestions Section"—namely, the June and September issues. The "In Reply" page need not be taken into consideration.

Prizes for Contributors Concerned

Every vote received in the contest will be recorded so that the suggestions can be arranged in the order of popularity indicated by the votes. When this has been done the competitor whose entry is found to coincide with the four suggestions heading the list so obtained will receive a prize consisting of a cheque to the value of one guinea, whilst the competitor who is next nearest to the general consensus of opinion will be rewarded with a cheque for half a guinea. Twelve other competitors who closely forecast the correct results will each be presented with a complimentary copy of the "Meccano Standard Mechanisms" Manual.

Entries from Overseas readers will be considered in a separate section. For particulars, see page 779.

The contributor who sent in the suggestion that is voted by our readers as the best published during the year will receive a cheque to the value of half a guinea, and the three contributors whose suggestions are voted to be the next best in order will be presented with Special Certificates of Merit.

Entries in this competition must be written on postcards. It is only necessary for the competitor to quote in what he considers to be their order of merit the numbers of the four suggestions that constitute his choice. The competitor's name and address must be written on the postcard, and the latter should be addressed "Suggestions Competition," Meccano Ltd., Binns Road, Liverpool. All entries must be received at these offices by January 31st, 1927.

A New Pastime for the Winter Evenings

(67)—Meccano Kinetograph

We illustrate a very interesting Meccano model of a Kinetograph, with which Ernest H. Bradshaw, of Attercliffe Common, Sheffield, secured first prize in Section B of the recent No. 3 Outfit Model-building Competition. The model is one of the most interesting that can be built with this size of Outfit, and should provide many hours of real amusement during the present wintry evenings.

Most Meccano boys are probably aware of the principles of the Kinetograph, but for the benefit of those who have not seen one in action, we may mention that it is a device that imparts an appearance of animation to a series of pictures, each differing slightly from the other and passed in rapid succession before the eyes. In this respect it resembles the remarkable principle upon which the modern cinematograph is based.

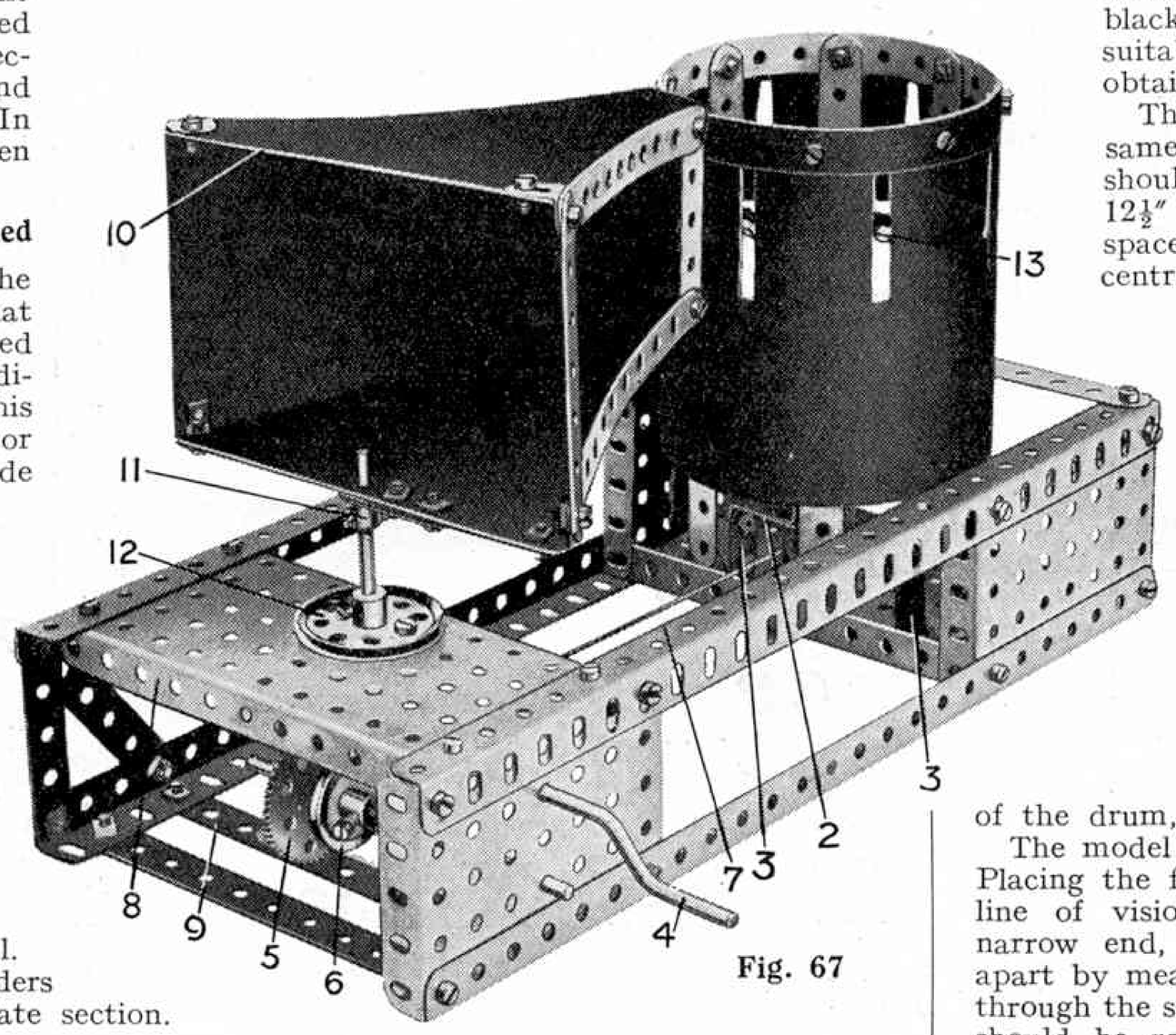


Fig. 67

In constructing the Meccano model the following details will prove useful:—The drum consists of a 12½" Strip bent to form a circle, with its ends overlapping one hole, and bolted to eight vertical 5½" Strips forming the sides. Two pairs of opposite 5½" Strips are connected by 3½" Strips and Angle Brackets bolted in the third holes from their lower ends.

The 3½" Strips cross at right angles to one another and are bolted in the centre to a Bush Wheel, in the boss of which is secured a short Rod forming the pivot of the revolving drum. This Rod is journalled in a Double Bent Strip bolted to a 2½" × 1" Double Angle Strip 2. This, in turn, is secured to the base of the model by two 1" × 1" Angle Brackets 3. A further bearing for the short Rod consists of a Crank bolted in the base of the model.

The drum is rotated from the Crank Handle 4, on which is mounted a ½" Pinion engaging a 57-teeth Gear Wheel 5 secured to a 3½" Rod carrying a Pulley Wheel 6. The latter is connected by means of a cord 7 to a similar wheel nipped to the vertical spindle of the drum. Bearings are provided for the inner ends of the Crank Handle and 3½" Rod by a Double Angle Strip bolted between the plate 8 and 5½" Strip 9.

The sighting box 10 is built up from a framework of strips and is secured by means of a Crank 11 to a short vertical Rod rigidly mounted in the boss of the 1½" Pulley 12. The four sides of the framework 10 are covered with some black material; stiff black paper suitable for this purpose may be obtained from any stationers.

The drum is enclosed in the same way, but the covering paper should be cut in a strip measuring 12½" × 4½" and pierced with slots spaced 1½" apart (from centre to centre) so that they fall exactly between the upright 5½" Strips. The slots should measure 1½" × ⅛".

The type of drawing suitable for use in this model is shown in Fig. 67a, and the dimensions indicated therein should be followed carefully. No doubt Meccano boys will be able to devise numerous amusing pictures of a similar kind for themselves. The strip of stout white paper carrying the sketches is inserted in the bottom of the drum, as indicated at 13.

The model is now ready for operation. Placing the frame 10 over the eyes, the line of vision is directed through the narrow end, where the strips are held apart by means of Double Brackets, and through the slots in the drum. The latter should be rotated rapidly by operating the handle 4, and as it revolves, the little dog shown in Fig. 67a will be seen jumping over the fence with a most realistic and amusing action.

The appearance of the pictures will be improved greatly if the model is placed in such a position that a strong light is directed on to the drawings inside the drum.

PARTS REQUIRED:

1	of No.	1	1	of No.	15A	12	of No.	38
17	"	" 2	2	"	" 16	1	"	" 45
6	"	" 3	1	"	" 19	1	"	" 46
1	"	" 4	1	"	" 21	1	"	" 48A
3	"	" 5	2	"	" 22	2	"	" 52
4	"	" 8	1	"	" 24	3	"	" 53
2	"	" 11	1	"	" 26	4	"	" 59
12	"	" 12	1	"	" 27A	2	"	" 62
2	"	" 12A	82	"	" 37			

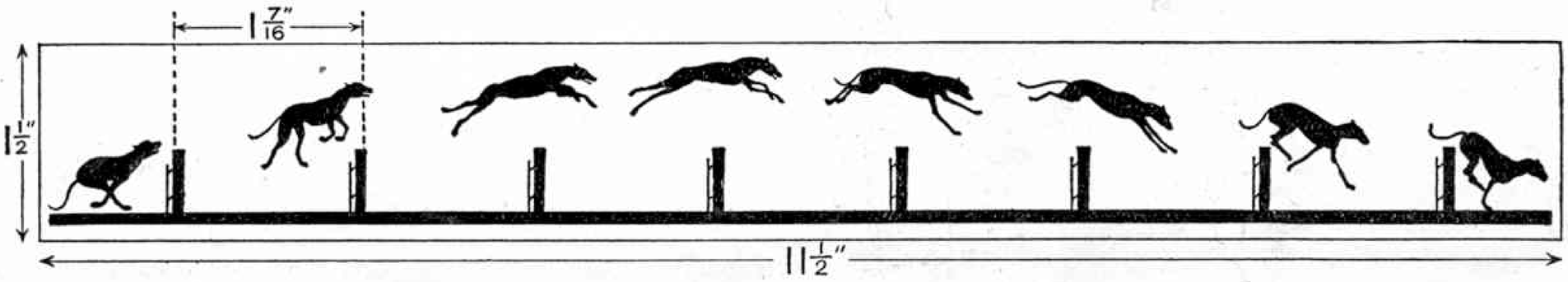


Fig. 67a

Specimen of the type of drawing to be used in the Meccano Kinetograph

GAMAGES

World's Biggest Christmas Bazaar



Take up CHEMISTRY

Start with a Statham Cabinet Outfit (as illustrated) with sufficient chemicals for 50 experiments. Complete with full instructions. Post 6d. Price **5/6**

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with Deplacer and working Cylinder fitted into each other.



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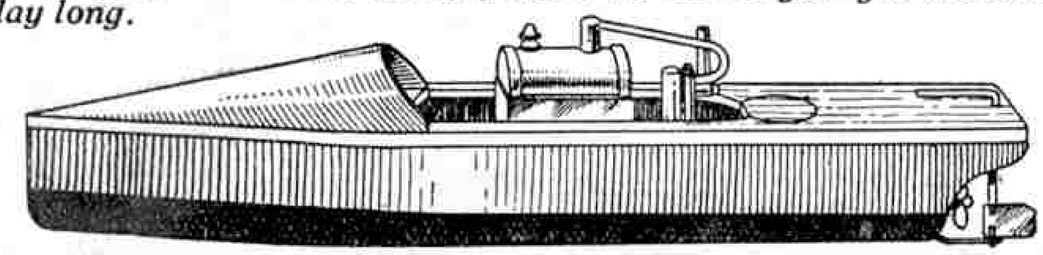
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NIAGARA FALLS IN LONDON!

Thousands of gallons of falling water every hour!

Father Christmas firmly established here in a veritable Fairyland of Delight, distributing lucky parcels to all his young visitors all day long.



HERE'S A FINE RACING LAUNCH

22½ in. long, 4½ in. beam. Beautifully shaped. Engine unit is of improved pattern with lamp which raises a big head of steam in a very few minutes. New Automatic Greaser is fitted as lubricator and gives greatly increased speed. Complete with non-spill lamp, filler and full instructions. POST 9d. **12/6**

GET THIS FAMOUS WEBLEY PISTOL!

·177 or ·22 Calibre.

This Air Pistol is supplied in Box containing "Webley" special Pellets, spare Washers, and Cleaning Rod.

GUARANTEED ACCURACY

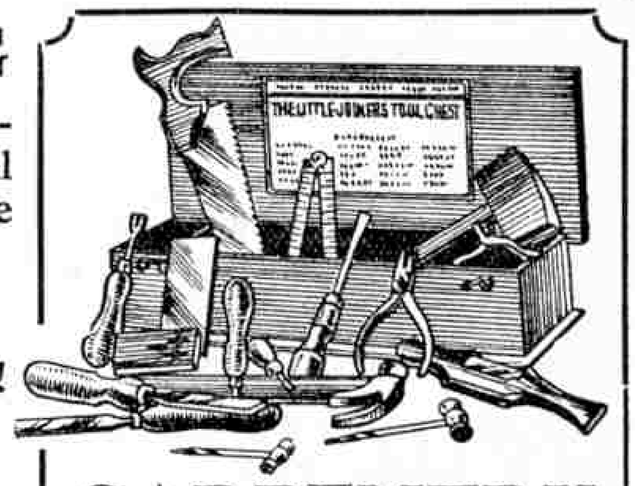
All Pistols before leaving the Factory are mechanically tested for accuracy up to 10 yds.

Extremely accurate. Weight 22 oz. The Barrels are interchangeable. Price **30/-** Extra interchangeable Barrels **10/-** net.
·177 Pellets, **2/6** per 1,000.



POST 6d.

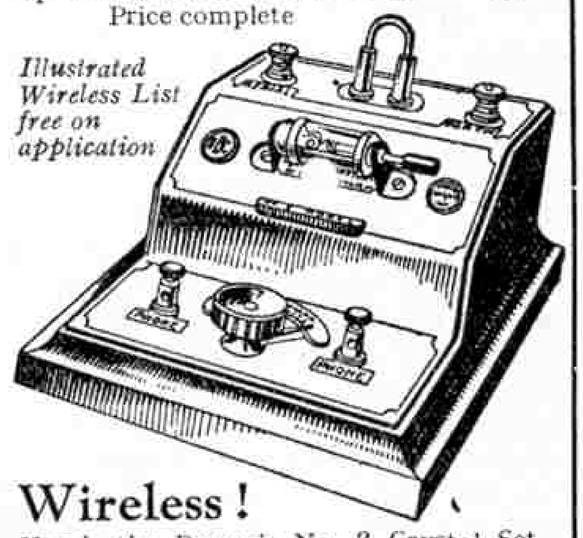
·22 Pellets, **2/6** per 500. For the best shooting results use "Webley" Pellets.



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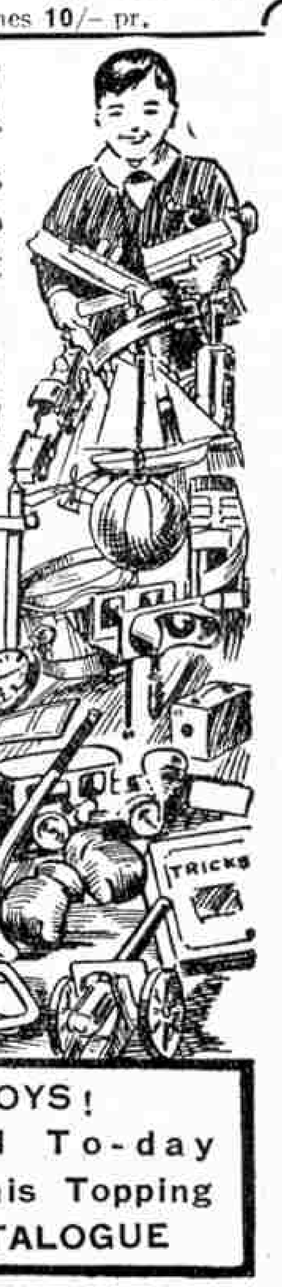


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BOYS!
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In Reply

In these columns we reply to suggestions regarding improvements or additions to the Meccano and Hornby Train systems. We receive many hundreds of such suggestions every week, and consequently we are able to publish only ideas that show particular interest or ingenuity. Every idea, however, whether acknowledged in these columns or not, is carefully examined and considered. Practical suggestions that prove to be in popular demand are marked down for adoption at the first available opportunity. It would be of great assistance if readers, when submitting suggestions for consideration, would write them on separate sheets of paper and include their name and address on each sheet used.

Suggested Meccano Improvements

MECCANO ANNUAL.—As announced in our September issue, we have previously entertained the idea of introducing every year a publication of a similar character to your suggested "Meccano Annual," but we fear that the question must again be left to the future, owing to the amount of work at present on our hands. (*Reply to C. F. Harrott, Truro, Cornwall*).

MODEL-BUILDING HINT.—Many readers have suggested the use of two Bush Wheels bolted together as a substitute for the ordinary Coupling when it is required to join two Rods end to end. This hint should prove of value in cases of emergency, when no Coupling is available. With reference to your other suggestion you will be pleased to learn that in the type of Bush Wheel manufactured for some time past the small protruding piece on the opposite side to the boss has been deleted, or at least reduced to a negligible quantity. (*Reply to C. F. Harrott, Truro, Cornwall*).

Suggested New Meccano Parts

NEW DOUBLE ANGLE STRIPS.—We do not consider that it is necessary to introduce Double Angle Strips in 7½", 9½" and 12½" lengths, as such pieces are seldom required. (*Reply to A. Davis, St. Kilda, Melbourne*).

CIRCULAR SAWS.—See our remarks in the September "*M.M.*" concerning the introduction of these parts. (*Reply to P. Mofflin, East Freemantle, W.A.*)

CIRCULAR RACK STRIPS.—Your suggestions re various types of circular rack strips are interesting and are receiving attention. (*Reply to L. Offord, Ipswich*).

CURVED GIRDERS.—See our reply under this heading in the "*M.M.*" for September 1926. (*Reply to R. Nurse, Port-of-Spain, Trinidad*).

IMPROVED SECTOR PLATE.—We do not consider the addition of extra holes in the surface of the Sector Plate would greatly enhance either the adaptability or the appearance of this part, but we shall keep your recommendations in mind. (*Reply to R. Nurse, Port-of-Spain, Trinidad*).

THREADED BUSH WHEEL.—We have found little demand for this part as yet, but we have noted your suggestion. (*Reply to C. Acland, Sydney*).

SHORT TIE-RODS.—We are unable to discover much scope for short rods having threads cut at either end. (*Reply to L. Silver, London, N.16*).

DRIVING BELTS.—Leather belts cut to such small scale do not prove satisfactory in operation as driving belts. It is advisable to represent belt gear in Meccano models by Spring Cord or string, etc. If desired, miniature belts may be devised from tape or strips of linen, etc. (*Reply to J. Reed, East Grinstead*).

INTERNAL GEAR.—See our reply under this heading in the October Magazine. (*Reply to T. F. Scales, Manchester*).

STRIP COUPLINGS.—We believe the functions of your suggested part are already covered by the existing Strip Coupling, Part No. 63b. (*Reply to S. F. Limmer, Norwich*).

EYE PIECE WITH BOSS.—We have received several requests for an Eye Piece mounted on a boss and set-screw, and they are receiving careful consideration. (*Reply to C. Acland, Sydney*).

RADIATOR.—There are several objections to the introduction of a model radiator for motor-cars. The greatest lies in the fact that such an accessory could be adapted to only one particular size and type of car. A very good representation of a radiator can be obtained with existing parts. (*Reply to J. H. Waring, Newton Abbot and Leslie Nicholson, Rotherham*).

Suggested Hornby Improvements

TUBE RAILWAY.—Your designs for suitable surroundings for the suggested Hornby "Underground" trains are very interesting, but we consider that a miniature railway of this description could not be made sufficiently realistic. Long tunnels through which the Hornby Metropolitan and other trains may be run can be manufactured very easily at home by using a wooden or Meccano framework covered with dark paper or other material. (*Reply to E. J. Hollingum, Gravesend*).

GOODS DEPÔT.—A goods depôt is already included in the Hornby Series. (*Reply to A. Malkin, Leek, and others*).

AXLE BOXES.—We do not think the advantages accruing from the addition of axle boxes would justify the resulting increase in the cost of the rolling stock. (*Reply to D. F. E. Nash, Sutton, Surrey, and J. H. Neville, Darlington, West Australia*).

Suggested Hornby Improvements—(*cont.*)

"METRO" COACHES FOR CLOCKWORK SETS.—The Hornby Metropolitan Coaches are now available without electrical fittings. The new coaches are eminently suitable for use in conjunction with all Hornby Trains. (*Reply to G. Lawson and M. Willcocks, Seascale*).

BRAKE ON TURNTABLES.—See our reply under this heading in the November "*M.M.*" (*Reply to H. A. Trim, Guildford*).

IMPROVED TURNTABLES.—We shall consider your suggestion re the addition to the turntable of electrically- or hand-driven operating mechanism. (*Reply to E. Baker, Frinton-on-Sea and A. Hodgkinson, Fleetwood*).

4 ft. RADIUS CURVES.—We cannot at present entertain the idea of introducing curved rails of 4-ft. radius or larger to enable locos having six or more coupled wheels to be introduced. (*Reply to M. Beach, Southampton*).

NEW SIGNAL.—The type of signal that you suggest is not common on British railways and would not prove so popular as the existing type. (*Reply to T. Griffin, London, S.W.16*).

NAMEPLATES FOR STATIONS.—Your suggestions regarding the provision of detachable nameplates, bearing different inscriptions, for stations and signal-boxes have been marked for careful consideration later, together with several schemes of a similar nature that we have in hand. (*Reply to H. Storer, London, S.W.18; P. Summers, Newent, Glos.; R. G. Webster, Fife; L. Harris, Belfast; and R. G. Bridge, Bournemouth*).

NEW STATIONS.—We have received a number of requests for the addition of stations bearing denominations other than "Windsor," for use when two or more stations are required in a single layout. The above suggestions concerning detachable nameplates were prompted with a view to overcoming this difficulty of the single type of station, and the whole question is receiving every attention. (*Reply to V. Overall, Leyionstone, E.11 and W. L. Denton, Harrogate*).

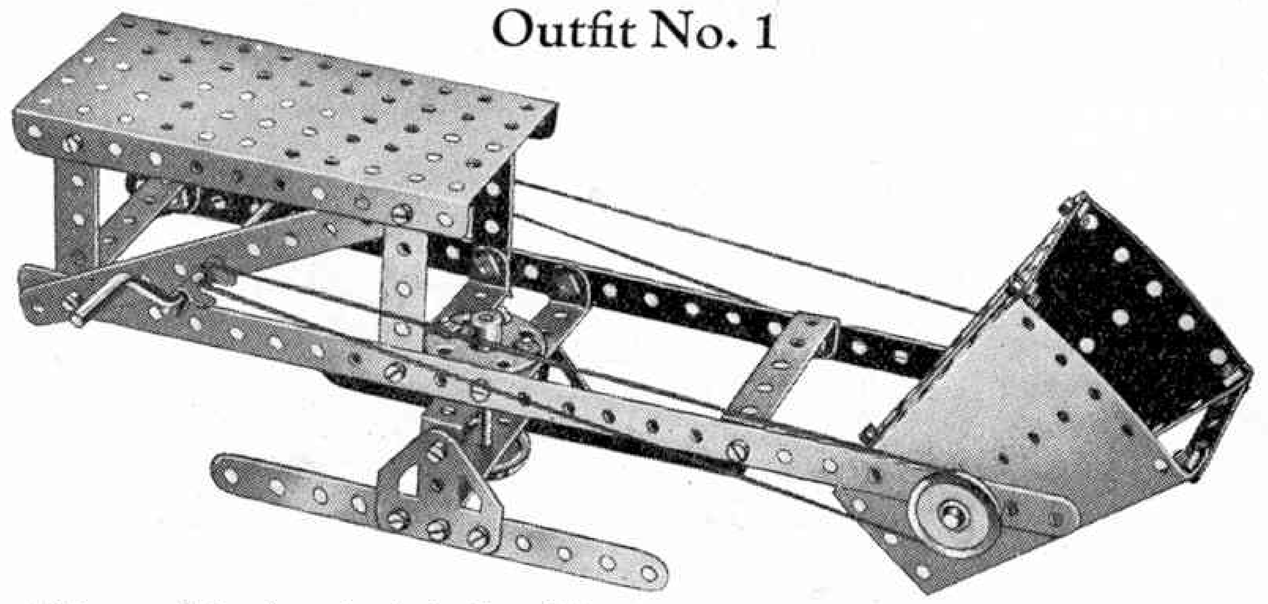
CAST WHEELS.—See our reply on this subject in the May 1926 "*M.M.*" (*Reply to J. H. Neville, Darlington*).

CHAIN COUPLINGS.—Your suggestion re the substitution of chain couplings for the existing form of connection between carriages has been noted for future consideration. (*Reply to W. H. Payne, Stoke-by-Clare*).

DESTINATION BOARDS.—The addition of destination boards for attachment to the locos and corridor coaches would certainly be ornamental, but would serve no really useful purpose, and we therefore doubt whether the necessary increase in the cost of production would be justified. Moreover, such small accessories are not popular as a rule, owing to the inconvenience of handling and packing. (*Reply to R. B. Grice, Swanage; J. Begg, Glasgow; L. Harris, Belfast; H. Storer, London, S.W.18; J. H. Neville, Darlington, W. Australia; and others*).

ISLAND PLATFORMS.—These accessories are now available. (*Reply to W. R. Tomkins, Norbury, S.W.16, and others*).

Model of Giant Foundry Ladle built with Outfit No. 1



This model of a giant ladle of the type used in handling molten metal in foundry operations secured an award for John Thompson, of Scotstoun, Glasgow, in the "No. 1 Outfit" Competition. The bucket-like container, consisting of two Sector Plates bolted together at the top by 2½" Strips and at the bottom by Flat Brackets, represents the ladle into which the metal is poured from the converter. The container swings about a central pivot so that it may be brought into position over the moulds that receive the metal. It may be tipped on rotation of the Crank Handle shown, on each end of which cords are wound two or three times between a pair of Spring Clips. The bucket is secured to its axle by means of Spring Clips placed upon the axle and pressing against either side of each of the two Sector Plates.

PARTS REQUIRED:

2 of No. 1	1 of No. 16	1 of No. 22A	2 of No. 38	2 of No. 54
4 „ „ 2	1 „ „ 17	1 „ „ 24	1 „ „ 40	2 „ „ 126A
6 „ „ 5	1 „ „ 19	8 „ „ 35	6 „ „ 48A	
2 „ „ 10	3 „ „ 22	30 „ „ 37	1 „ „ 52	

Overseas "Suggestions" Contest

(*see page 777, column 1*)

Entries received from Overseas readers in connection with the "Suggestions" Voting Competition will be considered separately and cash prizes will be awarded as follows: First Prize: half a guinea sterling or its equivalent. Second Prize: five shillings sterling or its equivalent. In addition, the contributor who sent in the suggestion that is voted by our Overseas readers to be the best published during the year will be presented with seven shillings and sixpence, while the three contributors whose suggestions are voted to be the next best in order will each be presented with a special Certificate of Merit.

Postcards should be marked "Overseas Section." Entries must be received at these offices on or before 31st March 1927.

Engineering Educator

Year by year engineering plays an ever-increasing part in everyday life and the call for skilled engineers grows accordingly. However great a man's natural ability in practical work, he cannot rise far in the engineering profession without acquiring in addition a sound theoretical knowledge that will enable him to grasp clearly the basic principles underlying his work.

The "Engineering Educator" that is now being produced by Sir Isaac Pitman & Sons Ltd., aims at giving all-round instruction in the various branches of engineering such as is required by young men who are anxious to equip themselves for responsible posts. The whole work, which will be issued in thirty fortnightly parts, price 1/3 each, is edited by W. J. Kearton, M.Eng., A.M.I.M.E., A.M.I.N.A., and the special contributors include such authorities as Sir Robert Hadfield, Bt., Professor A. H. Gibson, Sir Archibald Denny, Bt., Professor W. H. Watkinson and Mr. John Goodman, M.I.C.E., M.I.M.E. The work is well printed and illustrated with a large number of excellent photographs and diagrams, and can be strongly recommended to all who wish to increase their knowledge of any branch of engineering.

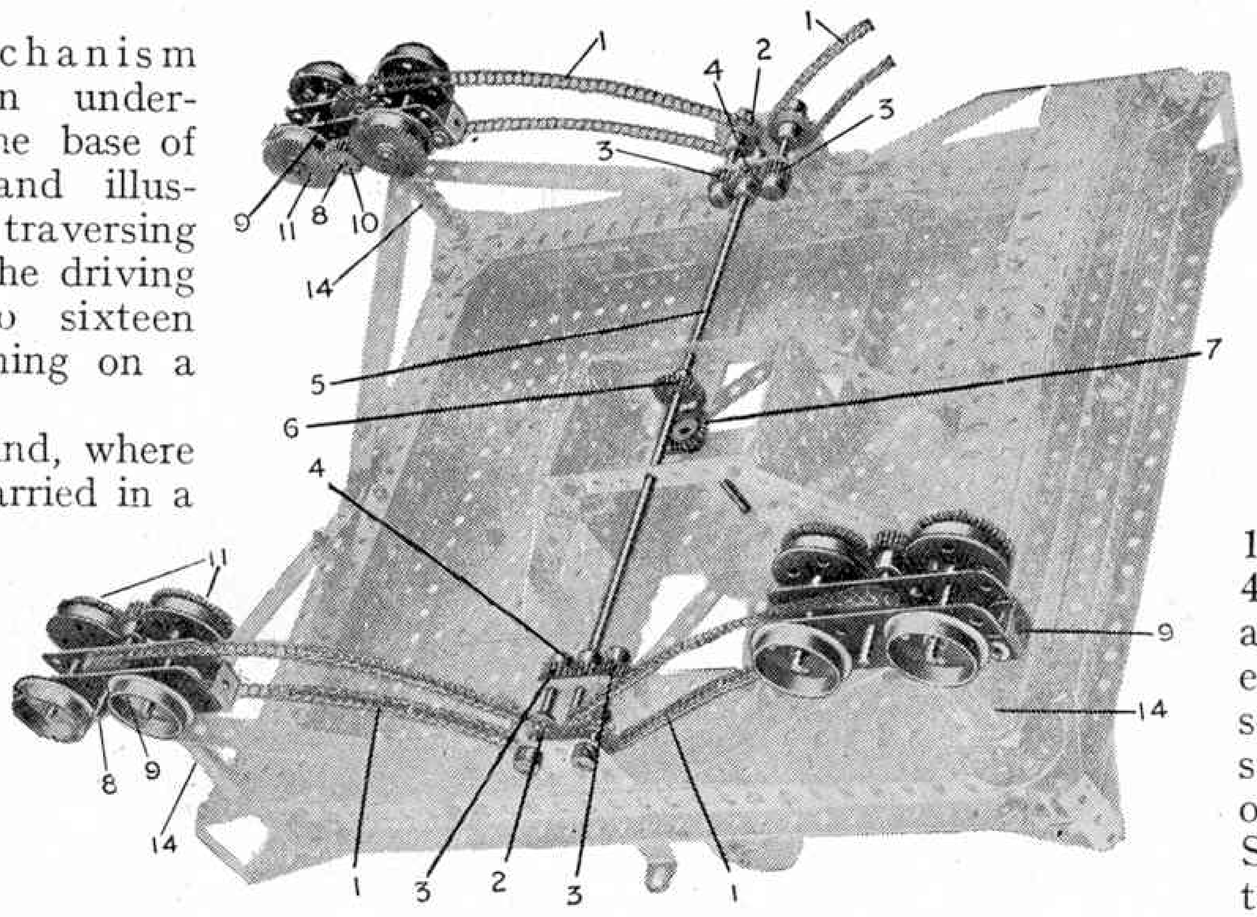
MECCANO
STANDARD MECHANISMS

Section XI. Traversing Mechanism

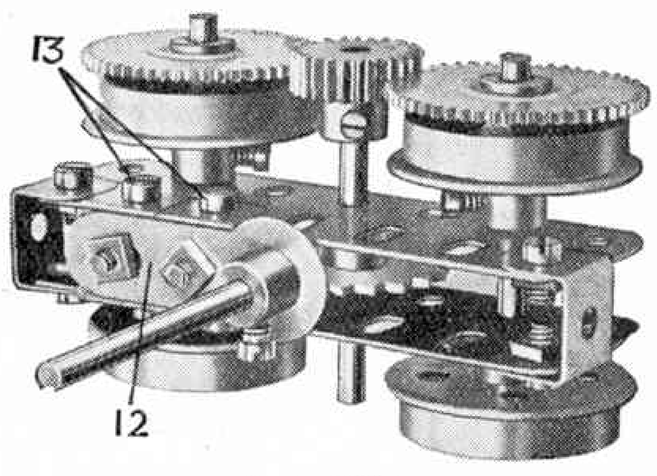
This article is one of a series dealing with a number of interesting Meccano movements that we have termed "Standard Mechanisms," for the reason that they may be adapted with advantage to numerous Meccano models—in most cases without any alteration, but in some few instances with only slight alterations to the standard movement. We have already dealt with a number of interesting subjects, including Gear Ratios, Belt Mechanism, Pulleys, Levers, Drive-Changing Mechanisms, Brakes, Steering Gear, Screw Mechanism, etc., and this month we describe several types of Meccano Traversing Mechanisms that are applicable to a variety of models.

STANDARD Mechanism No. 165 is an underneath view of the base of a heavy Dragline, and illustrates a type of traversing mechanism in which the driving power is coupled to sixteen travelling wheels running on a quadruple track.

In models of this kind, where the motive power is carried in a swivelling superstructure, it is sometimes a difficult matter to devise a means by which the drive can be transmitted smoothly and easily to the road wheels. The transmission must necessarily pass through the pivotal centre of the structure, and in models of the weight and dimensions of the Dragline, steps must be taken to obviate the great strain that in the ordinary way would centre upon that point. The solution to this difficulty usually lies in the adoption of roller bearings, which distribute the weight of the pivoting body over a large area and reduce friction to a minimum by the provision of rolling contact surfaces. The bearings for the Meccano Dragline are identical in form to Standard Mechanism No. 101 (Section VII.)



S.M. 165



S.M. 165a

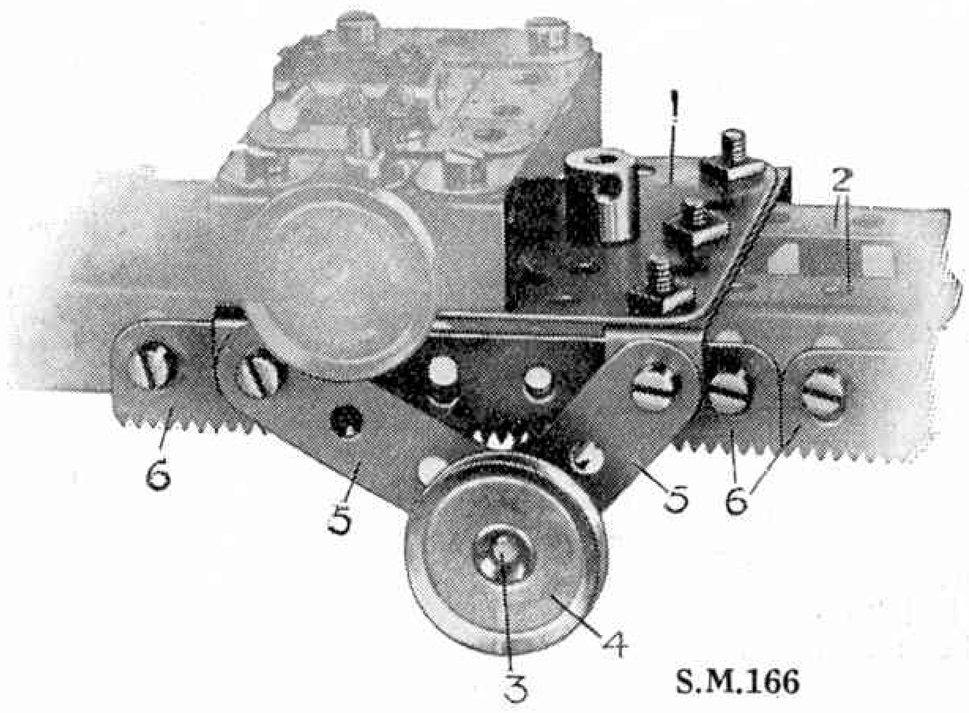
S.M. 165. Traversing Mechanism

It will be seen from the illustration that the drive is led by way of a vertical shaft and Bevel Gears 6 and 7 to the transverse 11½" Rod 5, and two ½" Pinions 4 on either end of this Rod actuate further ½" Pinions 3, each of which is mounted separately on a short Rod suitably journalled in the base of the machine. Four ¾" Sprocket Wheels 2 secured to the shafts of the Pinions 3 are each connected by lengths of Sprocket Chain 1 to 1" Sprocket Wheels mounted on short Rods 8 journalled in the centre of the bogies 9. The eight wheel axles are all rotated in the same direction by means of ¾" Pinions 10 gearing with 50-teeth Gear Wheels 11.

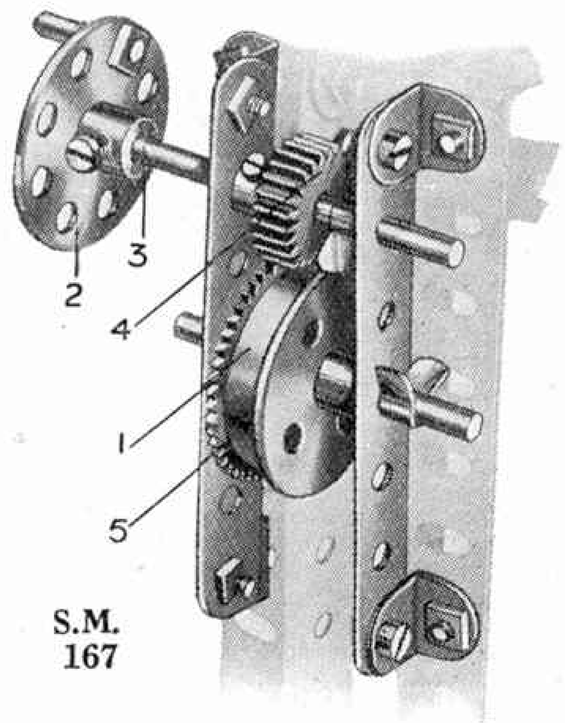
One of the four-wheeled bogies is shown in detail in S.M. 165a. The Crank 12, seen in this illustration, is bolted to two Double Brackets 13, and forms a socket to receive the upright columns 14, which are secured in Bush Wheels bolted to each corner of the base.

It will be noted that these columns are reinforced by a series of Collars and Set-screws, or Couplings, and they are further stayed by a number of Perforated Strips.

The play allowed in the Sprocket Chain transmission is sufficient to permit the bogies to turn slightly when negotiating curves in the track.



S.M.166



S.M. 167

S.M. 166—Rack and Pinion Mechanism

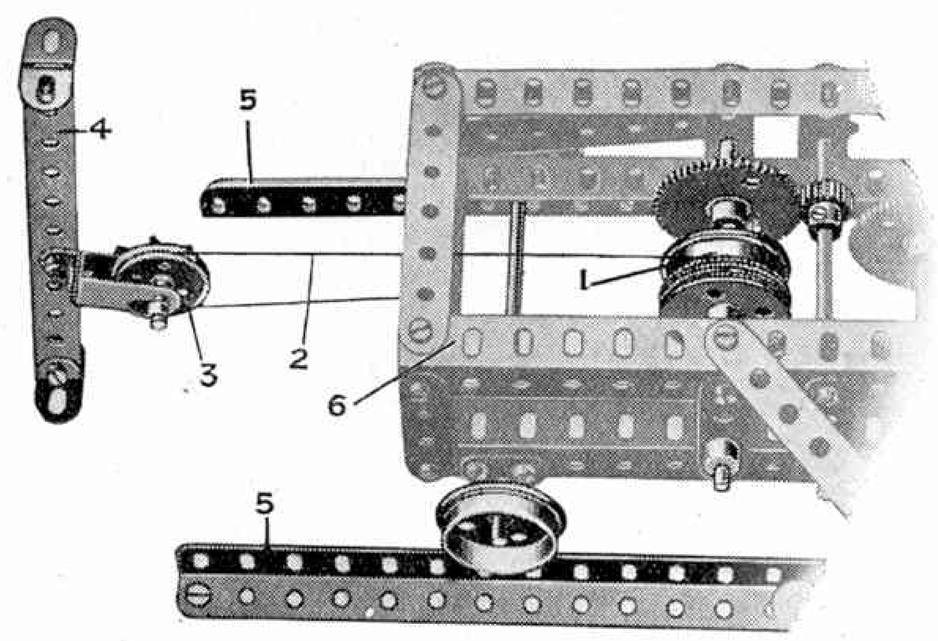
Rack and Pinion gear possesses a wide range of utility. In actual practice it is employed for an innumerable variety of purposes, ranging from the operation of a steep mountain railway to the simple gear sometimes used in opening a row of factory windows.

S.M. 166 shows Rack and Pinion gear adapted to actuate the saddle of a lathe. The saddle 1 rests upon the Girders 2, and is bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, the ends of which slide upon a Rod set longitudinally between the Girders. The shaft 3 of the hand-wheel 4 is journalled in strips 5 bolted to the saddle, and carries a $\frac{1}{2}''$ Pinion which engages the Rack Strips 6.

As the hand-wheel rotates, the Pinion is forced along the Rack, carrying the saddle with it.

S.M. 167—Traversing Mechanism

This illustrates the foot of a crane or similar model, in which the travelling wheel 1 is operated from a hand-wheel 2.



S.M. 168

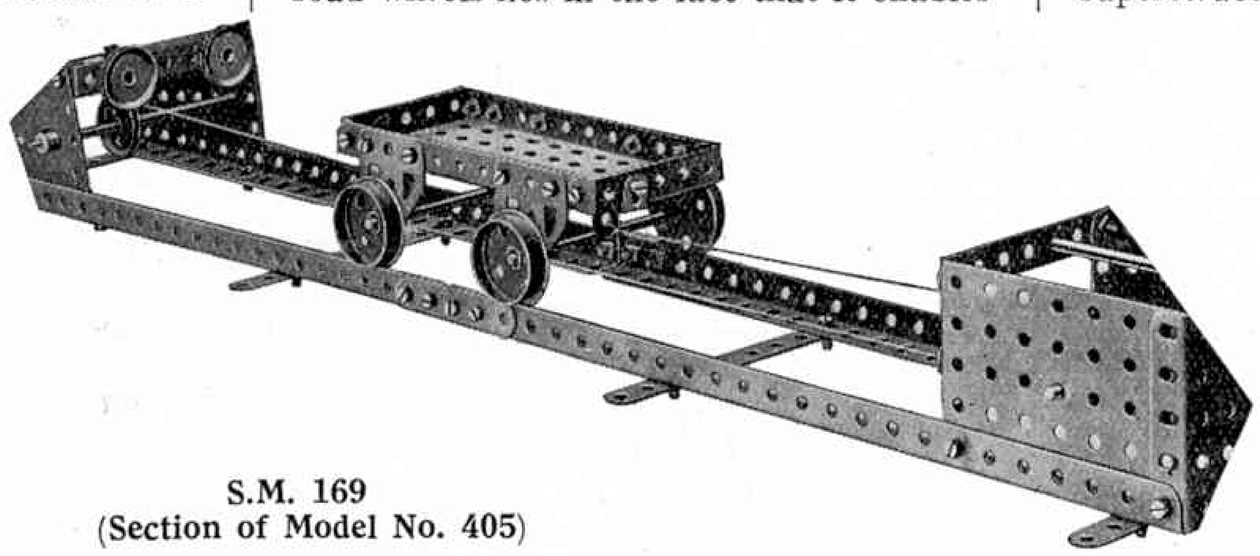
The shaft 3 of the hand-wheel carries a $\frac{3}{4}''$ Pinion 4 which engages a 50-teeth Gear Wheel 5 secured to the axle of the Flanged Wheel 1. The latter is one of four wheels similarly situated in the base of the model, and all are arranged to traverse a suitable stretch of track.

If desired, the shaft 3 may be operated from an Electric Motor or other source of power by substituting a Sprocket Wheel for the hand-wheel 2 and driving same through a Sprocket Chain or similar gear.

S.M. 168—Self-Hauled Travelling Carriage

In this interesting apparatus the moving machine *pulls* itself along by means of a revolving drum 1 which slowly winds up a cord 2. The latter passes round a 1" Pulley 3, carried from the post 4 secured in position at the head of the track 5, and its end is attached to the framework of the carriage 6. S.M. 168 illustrates a section of the Coal-Cutting Machine (Model No. 703), in which this type of traversing mechanism is employed in moving the cutting tools slowly along the coal face as the coal is cut away.

The principal advantage possessed by this system over the ordinary method of coupling the motive power direct to the road wheels lies in the fact that it enables



S.M. 169
(Section of Model No. 405)

a comparatively light machine to proceed against a greater resistance than would be possible if it depended for its motion upon the adhesive power of its wheels on the rails.

S.M. 169—Endless Rope Traversing Gear

This movement is employed in overhead cranes, gantries, endless-rope railways, transporters, conveyors, etc., and numerous other models where it is required to move a trolley or truck to and fro along a stretch of track. Its construction consists of an endless cord secured to the trolley and passing round a pulley at either end of the runway. One of the pulleys imparts the motive power, and the cord should be given an additional turn round this pulley to obtain sufficient "grip."

Sprocket Chain and Wheels may be used in place of the cord and pulleys, when a more powerful and reliable drive will be obtained.

S.M. 170—Transmission of Motive Power to Road Wheels

The method of transmitting motive power illustrated in S.M. 170 is similar in principle to that described in S.M. 165, but is designed on a much smaller scale. In this case the gear is shown fitted to the Meccano Steam Shovel (Model No. 707), the swivelling superstructure of which is also supported on roller bearings (see S.M. No. 106, Section VII.)

An underneath view of the wheelbase of the Steam Shovel is shown in the illustration (S.M. 170).

The Motor is carried in the swivelling superstructure and the drive is led down to the road wheels by way of the vertical shaft 1. This shaft is journalled through the boss of the $3\frac{1}{2}''$ Gear Wheel 2, about which the superstructure pivots, and carries a Bevel Wheel 3 gearing with a similar wheel 4 on the transverse rod 5. The latter forms an axle for the centre pair of the six road wheels.

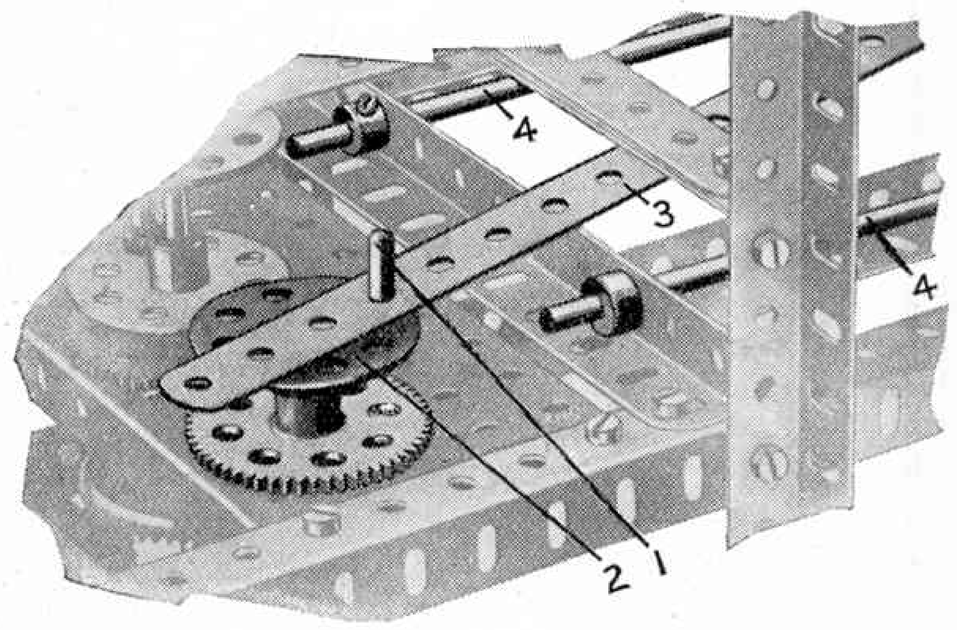
Motion is imparted to a second pair of wheels on the axle 6 by means of 1" Sprocket Wheels 7 and Sprocket Chain 8. The third axle may be coupled to the driving rod by similar means if desired, but the four driving wheels will be found to give sufficient adhesive power for ordinary purposes.



S.M. 170

S.M. 171—Reciprocating Motion

Where a part of a machine is required to reciprocate over a comparatively short distance, the necessary traversing movement may be imparted by ordinary crank and connecting-rod gear. In S.M. 171



S.M. 171

a Threaded Pin 1, secured to the Bush Wheel 2, pivotally carries a connecting Strip 3, which imparts to and fro movement to a carriage sliding on guide Rods 4.

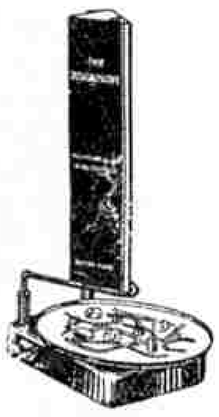
Observant readers will note that this illustration reproduces part of the Meccanograph, in which the mechanism described is employed to impart a short reciprocal movement to the carriage supporting the arm that carries the designing pen.

Alternative types of Reciprocating Drive Mechanism are shown in S.M. Nos. 252 and 264 (Section XIII.), while further interesting examples of Meccano traversing mechanism will be found in several models included in the complete Manual of Instructions. The aerial bucket in the Telpher Span (Model Nos. 34 and 108), and the passenger cars in the Funicular Railway (Model No. 728), are operated by similar methods to the endless rope gear described under S.M. 169.

Another useful device that should be mentioned in this Section consists of the Quick-Return Motion illustrated under S.M. No. 261. By means of this ingenious apparatus a rapid return movement is imparted to a sliding table or carriage.

BOYS—CHOOSE YOUR CHRISTMAS PRESENTS *NOW!*

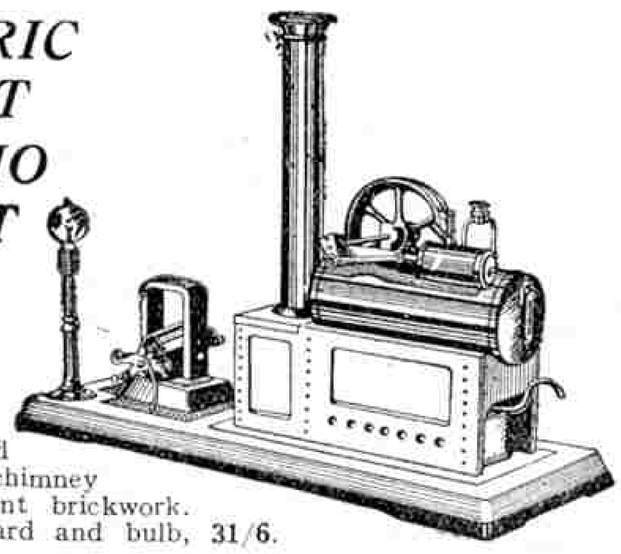
Here are some you'd like



THE "DESIGNOSCOPE"

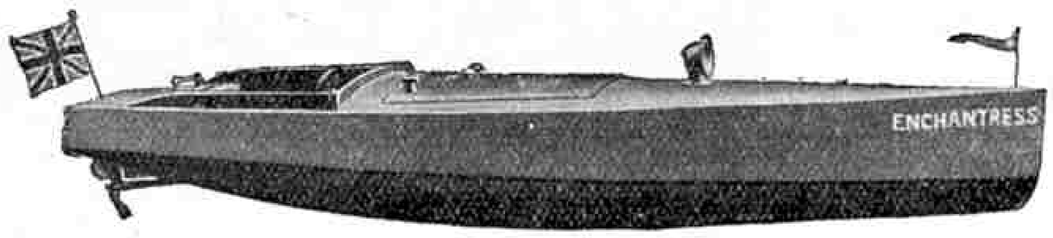
This instrument makes wonderful designs from rags, pieces of silk, flowers, etc. It consists of two mirrors so arranged over a revolving table that the reflection of the simplest object forms a constantly changing design of great beauty. Price **3/11**, postage 6d extra.

ELECTRIC LIGHT DYNAMO PLANT



This dynamo produces 4 volts, 0.25 amps. at 4,000 revolutions. It is fitted with a brass boiler, powerful fixed slide valve, cylinder safety valve, steam jet oiler, spirit lamp with three burners, and is mounted on a strong metal base, with chimney stamped and coloured to represent brickwork. Price, complete with lamp standard and bulb, **31/6**.

MODEL OF THE FAMOUS LAUNCH "ENCHANTRESS"



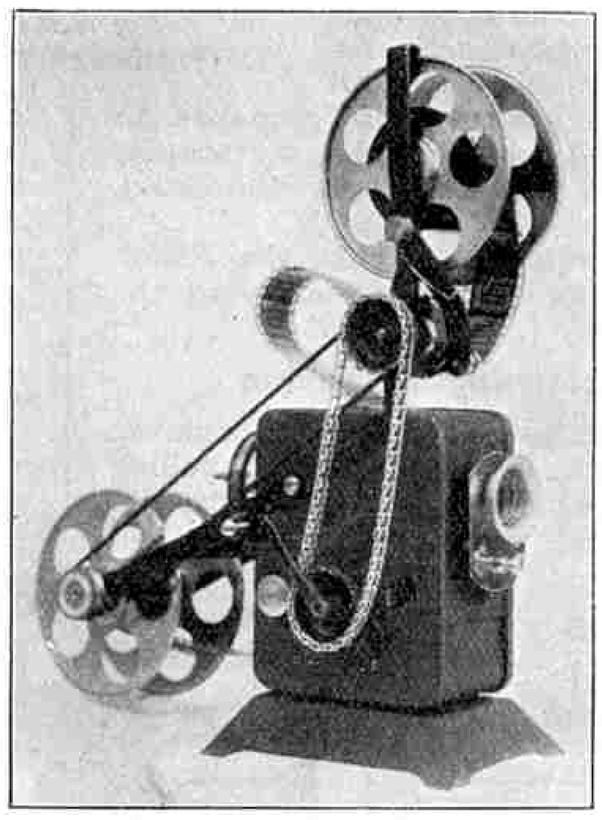
(Runs 4 hours on a 6d. lamp battery). The hull is built of specially selected mahogany, 25" long, enamelled white above the water line and green below. The boat is fitted with a powerful self-starting motor, operated by a miniature turnbuckle switch in the cabin and a brass double-blade propeller threaded on the shaft. Price **31/6**. Batteries **6d.** each.

At last!

THE PERFECT HOME CINEMA

Absolute Simplicity of Operation

No more dirty oil lamps



The "MILTOSCOPE"

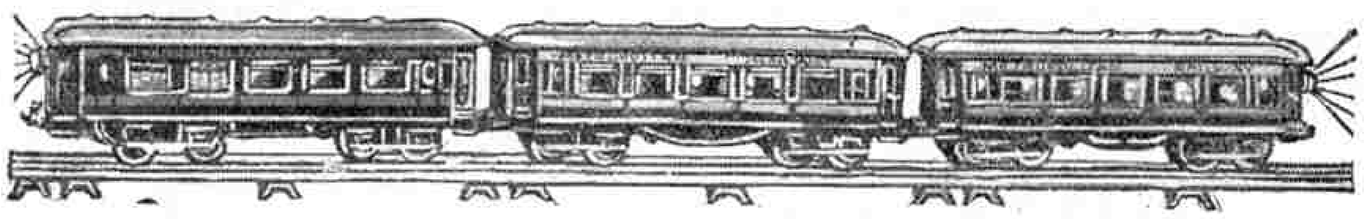
is a perfect model Cinema, lighted from the house electric light current by means of a plug attachment or from an accumulator where no domestic current is available. Takes up to 150 ft. of standard size film, and projects a beautifully clear picture of up to 5 feet across. Ideal for the Christmas Party.

Complete with Variable Resistance up to 250 *volts, Adapter Plugs, Projector Lamp, and one Film, price* **£3 : 3 : 0**. *Extra Films,* 50 *ft.,* **1/9**; 100 *ft.,* **2/6**.

MODEL ELECTRIC METROPOLITAN TRAIN

A first-rate model of these well known trains comprising motor coach with powerful new normal motor, reversing from the track, head and rear lights, Pullman type bogie wheel car filled with chairs and tables and lighted inside; to run from accumulator taking current from the centre rail.

The set comprises motor coach and one car, 12 curved large radius and two straight rails. Price **£2 : 19 : 6.**



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THE WALDEN REVOLVER

Heavily nickel-plated ten chambered revolver, with ejecting pin and safety catch. For stage use, also for the motorist, cyclist and traveller. Automatic action permits of ten cartridges being fired consecutively. Calibre, No. 1 Saloon blank cartridge size, short or long barrel. Prices **8/11** (post free **9/5**), **12/11**, and **16/11**. Blank cartridges **1/9**, post free **2/3**. **These cartridges cannot be sent abroad.**



Puzzles

December Puzzle Competition

I promised, when discontinuing the puzzles page in our March issue, that it would re-appear in the autumn but little did I expect to be so severely hauled over the coals when the October issue appeared without its puzzle page. Fortunately I had a good answer to my indignant young readers' complaint and all is now peaceful.

Christmas time is always a suitable opportunity for setting posers and while those in this month's set will provide many teasing moments, there are no special features that call for particular explanation.

The closing date for this contest will be 31st December and for the three best sets of solutions in order of merit there will be prizes of 15/–, 10/6 and 5/–. In addition, a number of consolation prizes, value 2/6 each, will be given.

There will be no overseas section.

Most of my readers will remember that it is customary for the "*M.M.*" to pay 2/6 for each puzzle published, while the best puzzle of the month receives 5/–. This payment will be continued and readers are invited to submit original puzzles for publication.

* * * *

Puzzle No. 187. *Contributed by E. A. Hancox (Birmingham).*

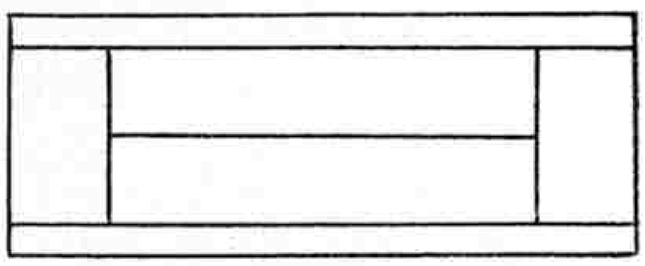
The following combination of letters represents an ordinary long division sum which is to be converted to figures. Certain clues to the actual identities of the numbers are hidden in the sum and careful observation will reveal them. To an ordinary observing person who applies the ordinary rules of arithmetic, it should not be necessary to take more than 10 minutes to solve the puzzle.

```
BT)KDNG(STP
   PK
  ----
  . FN
    TN
  ----
   BGG
    NB
  ----
   . . N
  ----
```

* * * *

Puzzle No. 188. *Contributed by F Kendall (Wakefield).*

The following is a diagram of a lawn tennis court. Where should the groundsman start and what route should he take to mark the court completely without lifting the marker and yet travel over the minimum distance twice?



* * * *

Puzzle No. 189.

A lady hired a horse from a farmer who was quite uneducated and very ignorant. Next day she received his bill which was as follows :—

	s.	d.
AOSFORAFADA	10	0
AFORTHOS	1	0
ASHOINONIM	2	6
ATAKINONIMOMEAGIN	1	0
	14	6

Puzzle No. 190. *Contributed by V. Halpe (Ceylon).*

Paul had some very curious ideas of his own and one of them was that of using his chess board as a memorandum pad. Taking his black king he moved it from one square to another putting down a different letter after each move of the piece. Paul thought that in so doing his secrets were hidden quite safely. But recently Paul learned a new long word and immediately recorded it on his board. One of his friends in examining the chess board found the words HOSPITALITY and CLEARNESS. Is the former really the longest word that can be traced or can you find a longer?

H	A	E	C	H	A	C	K
O	M	I	N	E	R	I	E
S	A	U	C	D	U	A	R
I	P	R	O	E	R	L	N
T	L	S	N	S	E	I	E
A	E	I	I	T	T	O	S
L	S	V	T	U	N	A	S
O	N	Y	M	S	I	L	R

* * * *

Puzzle No. 191. *Contributed by F. Kendall (Wakefield).*

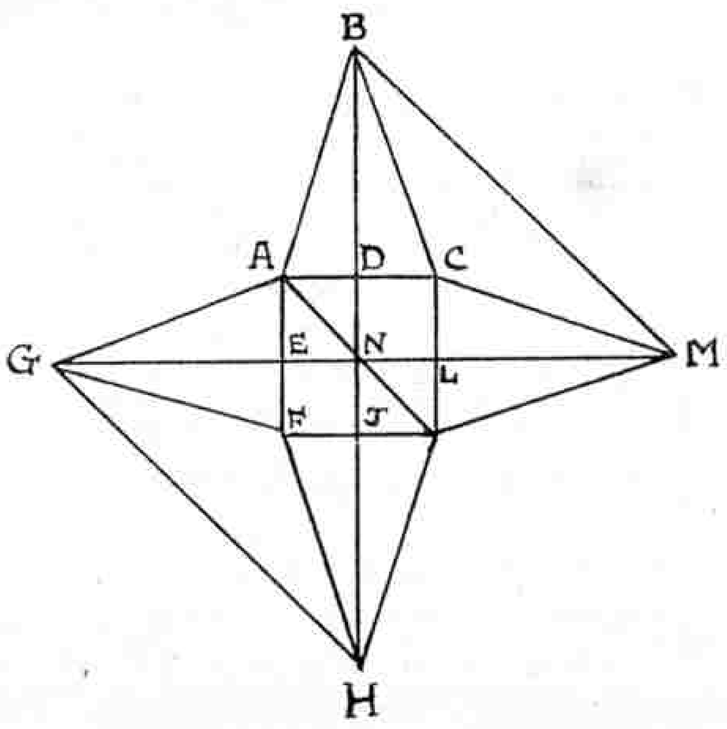
The following sets of letters when correctly arranged form three famous sayings from history. Can you find out what they are?

ADDGGHIMNORTY.
ADEEEEEFGHLMRTTU.
AABCEFIIIIIIGMNNNORSSTTTTTUW.

* * * *

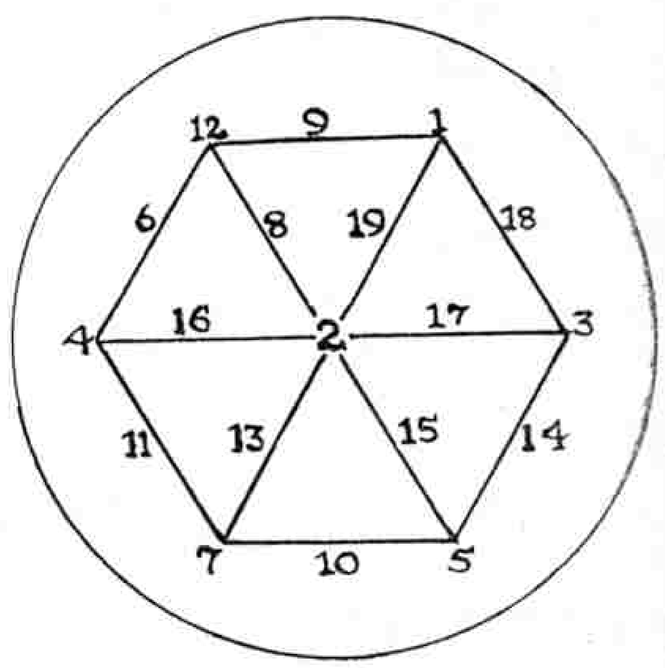
Puzzle No. 192. *Contributed by R. Warren (Wolverhampton).*

The diagram below represents a plan of the main streets of an ancient town. In showing a visitor round, which would be the quickest route to take to cover every street but not to traverse any one more than once? For the convenience of description, various points are lettered.



Puzzle No. 193. *Contributed by J. Dellow (Darwen).*

In the diagram below it will be seen that the figures on each of the lines radiating from the centre and also on the lines connecting up the outside points total 22. Can you re-arrange the number so that each of the 12 lines shall total 23 instead of 22?



* * * *

Puzzle No. 194. *Contributed by K. Toole (Tarana, N.S.W.)*

I have a head, a little head,
That you can scarcely see;
But I have a mouth much bigger
Than my head could ever be.
"That seems impossible," you say;
You think 'twould be a bother?
Why, no! My head is at one end,
My mouth's away at the other.
What am I?

* * * *

Puzzle No. 195. *Contributed by R. Riddle (Hexham).*

Here is a square divided into 16 small squares each of which bears a number. Can you cut the square into 4 parts and put it together again in a different way, so that the vertical rows, the horizontal rows and the diagonals, when added up separately come to 34?

1	15	5	12
8	10	4	9
11	6	16	2
14	3	13	7

* * * *

Puzzle No. 196.

CAN YOU TRANSLATE THESE?

Qui n'a beau dit mit a beau dit,
Comment trou le raille;
Qui n'a beau dit qui sait beau dit,
Nid a beau dit craille?

* * * *

Pas d'elle yeux Rhône que nous.

* * * *

Wah tah nah Siam
Ah! nah Siam.

* * * *

A B C D Goldfish.
M N O Goldfish.
S M R Goldfish.

BRITISH MADE JENKINS THE WOR-MAR TRADE MARK. PATENT FULLY GUARANTEED

Steam Engines for Meccano

(Meccano standard drilling by kind permission of Messrs. Meccano Ltd.)

Is your Meccano Outfit up to date?

"The Steam Era for Meccano"

Do you realise that if you are driving your models by clockwork or electricity, you are not only failing to make them realistic but your methods are out of date? A steam engine, if British made by model engine specialists, can do all that the old power units can do as regards power, safety and reliability and in addition you get—*realism!!* Your models are no longer toys but real engineering models—actual replicas in miniature of the large commercial machines. Nine-tenths of the working models in the Meccano Catalogue are in practice driven by steam. Imagine your Meccano crane hoisting the load amidst clouds of steam and the roar of a high speed steam engine! Doesn't it sound real and isn't it just that reality that your models have lacked?

Wormar Steam Engines are the

ONLY STEAM ENGINES MADE

to fit Meccano. Constructed only from solid British brass and steel and with our unique experience behind them, they are in quite a different class from the "tinny" but beautifully painted foreign engines which have brought model engines into disrepute. They are the outcome of 10 years' concentration and develop

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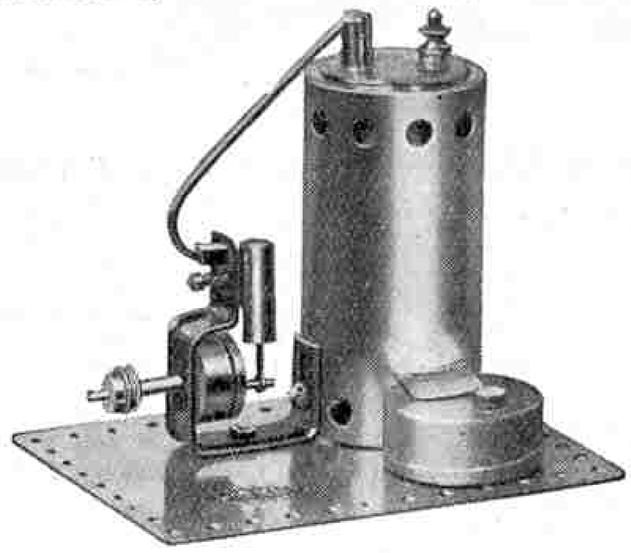
of the average foreign engine and more than most British ones at double the price. Numerous unsolicited testimonials confirm these statements. Send for details.

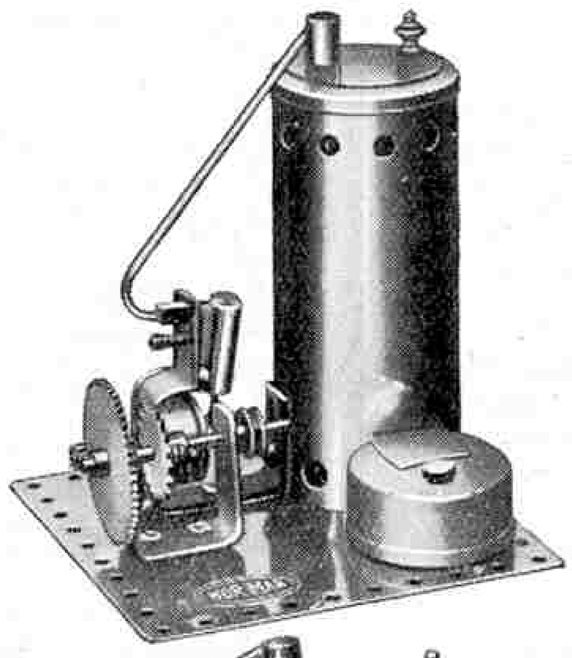
£5 PRIZES

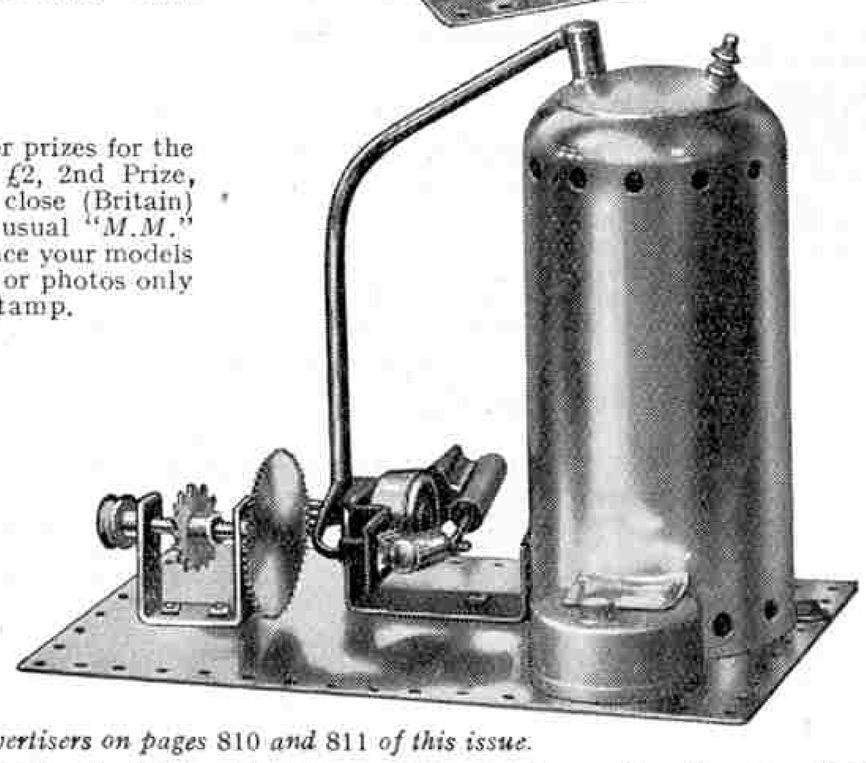
To encourage the craze for realism in Meccano Models, we offer prizes for the best Meccano Model driven by a Wormar Engine. 1st Prize £2, 2nd Prize, £1-5-0, 3rd Prize 15/–, and 4 prizes of 5/– each. Entries close (Britain) Feb. 28th, 1927, (Abroad) Mar. 31st, 1927. Conditions as usual "*M.M.*" contests and winner to be judged by Editor "*M.M.*" Commence your models now—it is rarely that a hurried design wins. Send drawings or photos only to address below. Full particulars on receipt of stamp.

IMPORTANT

We have made plans for 4 times the quantity of engines sold last Xmas, but orders are rushing in and we may run short. Our next batch cannot be ready until January, so if you want to secure yours for Xmas and cannot buy now, send P.O. 6d. (as guarantee), state model required, and your engine will be labelled and packed aside until you send the balance.







"TROJAN" MODEL
5/11

Post free 6/5. C.O.D. 6/9. Single cylinder, Bore ⅜". Stroke ¾". Boiler 2⅛"×1⅛" with outer firebox of polished brass 4½"×2¼" specially designed for retaining heat. Tinned steel base with Meccano drilling. Safety valve, lamp, filling funnel, and instructions. Runs for 20 mins. 3-5,000 revs. per minute.

"ELITE" MODEL
10/6

Post free 11/–. C.O.D. 11/6. Single cylinder. Bore ⅜". Stroke ¾". Boiler 3¼"×1¼". With outer firebox of polished brass 5¼"×2¼", specially designed for retaining heat. Nickel plated steel base with Meccano drilling. Geared countershaft to take Meccano chain sprockets, etc. Safety valve, lamp, etc. Suitable for driving large models or lifting fairly large weights in a crane. Runs for 30 mins. 3-5,000 revs. per minute.

"SUPER" MODEL
21/-

Post free 21/9. C.O.D. 22/5. Twin cylinders. Bore ⅜". Stroke ¾". Boiler solid drawn brass 3½"×2¼" with outer firebox 6¼"×3" of solid drawn brass, highly polished. Nickel-plated steel base with Meccano drilling. Geared countershaft to take Meccano chain sprockets, etc. Safety valve, lamp, etc. Enough power for practically any requirements. The last word in model engine design. Superb finish. Pulls well at slow speeds, but 3,000 to 5,000 revs. per minute guaranteed.

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WORBOYS & SMART, 170, KING STREET, LUTON

The Meccano Guild



A Great Fellowship of Boys

President: Mr. Frank Hornby ——————Inventor of Meccano

What the Guild Means The Meccano Guild is an organisation for boys, started at the request of boys, and conducted as far as possible by boys. In joining the Guild a Meccano boy becomes a member of a great brotherhood of world-wide extent, every member of which has promised to observe its three great objects; wherever he happens to be—even in strange countries—he will know he has met a friend whenever he sees the little triangular badge. The Meccano Guild is bringing together Meccano boys all over the world, and is helping them to get the very best out of life.

How it Commenced More than a million boys in Great Britain derive their greatest indoor pleasure from Meccano. Before the Guild was formed, hundreds of these Meccano boys wrote to us every week. They told us how they wished they could be put into communication with other Meccano boys and how they longed to be able to meet them. They asked if arrangements could be made so that their wishes might become an accomplished fact. We responded to their repeated and increasingly numerous appeals, and as a result the Meccano Guild came into being.

Why You Should Join Every Meccano boy should be a member of the Meccano Guild. All who have studied its objects must agree that the Guild cannot fail to have a profound effect for good on the lives of its members. It is ready to be of service to each individual member—to help or give advice whenever requested. At the head—guiding and controlling, and taking a personal interest in this great movement—is the President, Mr. Frank Hornby, Inventor of Meccano and Managing Director of Meccano Limited.

The Headquarters of the Meccano Guild are at the Head Offices of Meccano Ltd., Binns Road, Liverpool.

THE GUILD RECRUITING CAMPAIGN

Every Meccano boy should become a member of the Guild and do his utmost to help to make the objects of the Guild widely known. With this end in view, a Special Medallion is presented to each member of the Guild who obtains three new recruits. As a mark of further merit the medallion is engraved with the name of the recipient and with the words "Special Award" when six more members are recruited, making nine in all. Full particulars of the Recruiting Campaign, together with a supply of application forms, will be sent on request.

HOW TO BECOME A MEMBER

Membership of the Guild is open to every boy possessing a Meccano Outfit, or Hornby Train Set, who satisfactorily fills in the prescribed application form. The only conditions are that members promise to observe the objects of the Guild and to wear their badges on all possible occasions.

The price of the Guild membership badge is 7d. post free in the United Kingdom, but members abroad will be required to pay 5d. extra for registered postage A remittance for the necessary amount should be sent along with the form of application. The Guild badge is beautifully enamelled in blue and white and is made for wearing in the lapel of the coat. Any boy wearing the Guild Badge is at once recognised by other Meccano boys as being a member of the Guild and one who has undertaken to live a clean, truthful and upright life.

In addition to the badge, each member receives a membership certificate, measuring $7'' \times 9\frac{1}{2}''$. This certificate is printed in orange and sepia and is a smaller edition of the large club certificate.

Write to the Secretary of the Meccano Guild, Binns Road, Liverpool, asking for an application form and full particulars. Then fill in the form and return it to Headquarters. when you will be enrolled and your badge and certificate will be sent to you. Write to-day, and put M.N. after your name for reference.

The Secretary receives hundreds of letters every week from members all over the world and he hopes that new members will also write to him as often as possible.

MECCANO CLUBS

Meccano Clubs are founded and established by enthusiastic Meccano boys under the guidance of the Guild Secretary at Headquarters. At the present time there are over 100 affiliated clubs in various towns and villages in this country and abroad, together with a much larger number not yet affiliated. Each club has its Leader, Secretary, Treasurer and other Officials, all of whom, with the exception of the Leader, are boys. If the nearest club to you is too far away for you to join, or if you are unable to join for any other reason, consider the possibility of forming a new club in your own district. A special booklet explaining "How to run a Meccano Club" is now ready, and will be sent to any reader (post free) on receipt of 2d. in stamps.

AFFILIATION WITH THE GUILD

When a Meccano Club has been successfully launched and good progress is being made, affiliation with the Guild is granted. A beautiful club certificate, suitable for framing and hanging in the club-room, is presented, and the club becomes entitled to such privileges as the loan of interesting lectures and club membership cards.

All members of the Guild are eligible for the Merit Medallion, which is awarded to those who display special ability in connection with club work, or in helping the Guild.

THE CORRESPONDENCE CLUB

Members of the Guild are able to join the Correspondence Club, by which they are placed in communication with other Guild members in some other part of the country or abroad. To those boys who are interested in foreign languages the Correspondence Club presents a splendid opportunity of obtaining a correspondent in the particular country in the language of which they are interested. They are able to write to a Meccano boy in his native language, and as he would probably reply in English, the correspondence will be of mutual benefit. Stamp collectors also find the Club of value, as they are enabled to exchange stamps with their correspondents. Full particulars and enrolment form will be sent on application.

BADGE OF MEMBERSHIP

THE THREE GREAT OBJECTS OF THE GUILD

(1) **To make every boy's life brighter and happier.**

(2) **To foster clean-mindedness, truthfulness, ambition, and initiative in boys.**

(3) **To encourage boys in the pursuit of their studies and hobbies, and especially in the development of their knowledge of mechanical and engineering principles.**

BADGE OF MEMBERSHIP



With the Secretary

Signs of The Times

One of the most notable features in the programmes of Meccano clubs throughout the world is the steadily increasing variety and range of interests. While all clubs keep Meccano in the foreground as being the great hobby upon which their organisation is founded, there is a tendency to experiment with hobbies and amusements of all kinds, and to incorporate in the syllabus those features that prove generally popular. This tendency is excellent from every point of view, as it ensures that each member of a club can find something in the syllabus that is of particular interest to him personally.

Lectures are rapidly increasing in number and the subjects cover almost everything under the sun. Several Leaders, for instance, have lectured to their members on "The Story of Meccano," basing their lecture on facts supplied from Headquarters. These lectures have proved remarkably popular and I shall be glad to give the necessary assistance to any club Leader who cares to try the experiment for himself. Other lectures have included such widely varied subjects as "The Conquest of the Air," "Indian Railways," "Ancient Mechanical Contrivances," "The Game of Chess," "Oil Power in Modern Industries," etc.

Novelty Evenings

Many clubs are now arranging what are known as "Novelty Evenings," and these are invariably successful and well attended. The possibilities of such evenings are almost unlimited, but to give a hint to those clubs that have not tried the experiment it may be mentioned that one club has devoted evenings to the display of a model containing various mistakes, the members being required to find as many as possible: and the construction blindfold of a simple model. Many thoroughly interesting and enjoyable evenings may be arranged on similar lines.

One of our London clubs recently tried an experiment on decidedly unusual lines and apparently with very great success. At a certain time all the members were in their places, each with his Meccano set in readiness. Five minutes later an alarm of "Fire" was given. Each boy then set to work to build a fire engine and a fire-escape as rapidly as possible and rush with his model to a cupboard at the end of the room, supposed to represent the burning building. The competition proved almost desperately exciting and the Leader informs me that scarcely any boy spoke a word, each one being so keenly absorbed in his work and so determined to reach the cupboard first!

Still another welcome feature is the general introduction of Games Evenings. Table Tennis Tournaments are generally popular and they provide a special attraction for those boys who do not care to settle down to such games as chess or draughts. Air Rifle Shooting, too, is being very largely adopted and always with successful results. Leaders who think of introducing this pastime should read the article on the subject contained in Secretary's Notes in the "*M.M.*" for January 1925.

The Meccano Way!

One lone Meccano boy,
What was he to do?
Found a kindred spirit
And then there were two.

* * * *

Two keen Meccano boys,
Setting out with glee,
Met chum wearing Guild badge,
And then there were three.

* * * *

Three keen Meccano boys,
Models on the floor.
Another came to help them,
And then there were four.

* * * *

Four keen Meccano boys,
Very much alive,
A neighbour bought an outfit,
And then there were five.

* * * *

Five keen Meccano boys,
What did they do then?
Went on a recruiting tour
And soon there were ten.

* * * *

Ten keen Meccano boys,
Found a room to meet.
A grown-up Leader soon appeared,
And made the club complete.

P.E.C.

A Doll's House for Threepence!

I mentioned on the Club Notes page of the August issue, that the members of the Richmond (Surrey) Meccano Club were building a large Doll's House to be shown at a local exhibition, the boys' section building the house itself and the girls' section carrying out the interior decoration and furnishing. This house is now almost complete. It stands 28 in. high and is 32 in. in length and 16 in. across. It has five rooms and a hall with a verandah attached. Every room is furnished and finished off with cream paint and wall-paper. The Leader of the club informs me that this house is to be raffled, tickets for the raffle being sold at 3d. each. The tickets may be obtained any time up to 9th December, on which date the draw takes place, from the Leader, Mr. L. Hosking, 37, North Road, Richmond, Surrey, or from the Secretary, A. R. White, 15, Albert Road, Richmond, Surrey. The result of the draw will be announced on Saturday, 18th December, and whoever wins the Doll's House will certainly be a lucky person!

Proposed Clubs

Attempts are being made to form Meccano Clubs at the following places and boys interested in becoming members should communicate with the promoters whose names and addresses are given:—

BRIDLINGTON—G. E. Geach, 8, St. John's Avenue, or T. Walker, 168, Quay Road, Bridlington.

WANDSWORTH COMMON—H. Storer, 23, West Side, Wandsworth Common, or N. Coombe, 49, Melody Road, London, S.W.18.

CAWNPORE, INDIA—P. N. Mathur, 30, New Chowk, Cawnpore, India.

DARTFORD—Leslie Lee, 6, Brandon Road, East Hill, Dartford, Kent.

DOVER—Mr. E. Kirby, 21, Marine Parade, Dover, Kent.

KINGSTON—N. S. Dunn, 6, Beresford Road, Kingston, Surrey.

GUILDFORD—Mr. Geo. W. Bartlett, 4, Friary Street, Guildford.

RANGOON, INDIA—P. Damotharan, 38, Bowlane, Kalabusty Rangoon, India.

More Correspondence Club Members Required

Overseas members are joining the Correspondence Club in great numbers, especially from France, Australia, New Zealand, South Africa and India. English Guild members who would like a chum in any of these countries should join the Correspondence Club without delay. Boys of 16 to 18 are specially wanted. Correspondence with an overseas chum may be made very interesting by the exchange of photographs or stamps. Membership of the Correspondence Club is open to all members of the Guild without fee of any kind and enrolment forms and all particulars may be obtained on application to Headquarters.



CLUB NOTES

Liscard High School M.C.—Good progress is reported. A series of Lectures has been arranged, the following subjects being chosen: "Character," "Linen and its Manufacture," "How to Read a Wireless Diagram," with electrical demonstrations. "Round about the Dardanelles," and "The Human Machine." Games Nights are also included in the syllabus and are greatly enjoyed. *Secretary*: Frank Donaldson, Liscard High School, Wallasey.

Wisbech and Walsoken M.C.—Model-building is very popular, Motors, Bridges, and Farm Implements being built and operated at a recent meeting. Mr. Ransome has been re-elected as Leader and Miss Miller as treasurer. Meetings are held every Wednesday and an Exhibition is planned to take place shortly. Club roll: 9. *Secretary*: Sydney Ketteringham, 99, Norwich Road, Walsoken, Wisbech.

St. Albans M.C.—A library has been formed and a member appointed librarian. The chief activities are Model-building, Lectures, Competitions and Games. Club roll: 9. *Secretary*: H. M. Upward, Southmead, 19a, Worley Road, St. Albans, Herts.

Combe St. Nicholas M.C.—Members are very enthusiastic and the financial position of the club is good. An Exhibition of Models is arranged to take place shortly and entrants are busy preparing their models. Club roll: 17. *Secretary*: Kenneth Hake, Combe Wood, Combe St. Nicholas, Chard.

Great Baddow M.C.—The new feature of Visitors' Night is proving highly successful, and on the occasion of the last one an extensive Model-building Display was made. The following models were included:—Aeroplanes, Searchlight with electric battery and bulb, Tram Tractor, Clockwork Roundabout, Weighing Machine, Hauling Crane, Submarine, Snow Plough and Joy Wheel. On this occasion H. Bailes and W. Bonner were presented with Special Merit Medallions for their past good work for the club. A book was presented to H. Steele for an essay written on a lecture delivered by Mr. J. Pitts, the Leader, who spoke about "Electric Railways." Club roll: 23. Leader and *Secretary*: Mr. J. Pitts, Hills Chantry, Great Baddow, Nr. Chelmsford.

Cranham M.C.—Recent activities include the reading aloud of articles from the "*Meccano Magazine*" by the Leader, Mr. Cheshire, followed by a general discussion. Games Nights are devoted to Dominoes, Draughts and "Snakes and Ladders." Model-building evenings also have been greatly enjoyed. Club roll: 7. *Secretary*: John G. Cheshire, Post Office, Cranham, Essex.

Holy Trinity (Blackburn) M.C.—Good progress is being made, activities including Model-building, Lectures, Essays and Games. It is hoped to introduce such popular novelty evenings as "Mock Courts" and "Mock Parliament" meetings. Owing to the temporary absence of the secretary, the Leader has taken over his duties. Preparations are being made for the Club's Annual Exhibition, to take place in February. Club roll: 30. Leader: Mr. T. Hulme, 51, Peter Street, Daisyfield, Blackburn.

United School (Melton Mowbray) M.C.—This club is improving steadily, and the division of the members into two sections is under consideration. Model-building and Lecture Evenings are the chief feature of the syllabus. Mr. Moulds is the club President, and Mr. Rigby the Leader. Club roll: 24. *Secretary*: H. T. White, 25, Bayswater Road, Melton Mowbray.

Sandwich M.C.—Favourable progress is being made. The club has lost its Leader, Mr. R. Jezzard, who, however, still remains an interested patron. His successor to the Leadership is Mr. Albert Craig, 13, Paradise Row, Sandwich.

St. James (Gravesend) M.C.—Recently affiliated with the Meccano Guild, this club is in a flourishing condition. It was formed in January, 1926, and was originally intended only for members of St. James' Choir. At the present time, however, any boy may join the club, provided that he obtains a majority when voted for by the members. Meetings are held every Tuesday, and Meccano, Hornby, and Lecture Evenings alternate. The Leader is Mr. F. R. Kemp Potter, Lansdown Square, Rosherville, Gravesend. Club roll: 8. *Secretary*: E. Jones, 14, Granville Road, Gravesend.

Golders Green Crusaders (London) M.C.—Has been divided into two sections, "Nuts" and "Bolts," and the two are to be competitive in model-building. Lectures are given monthly on various subjects. Attendance marks and marks for model-making are to rank for Special Merit Medallions and prizes at the end of each session. Recruiting and advertising are being carried out in the hope of increasing the membership. Club roll: 28. *Secretary*: Morland Betham, 7, Woodside, Erskine Hill, Golders Green, London, N.W.11.

Accrington M.C.—Model-building is very popular and some notable models displayed recently were a Titan Crane, a Motor Bus, and a Two-seater Car. Lectures and talks have been delivered with great success by members. Club roll: 10. *Secretary*: R. W. Rush, 11, Kings Road, Accrington.

Castle Douglas M.C.—Recent activities have included a "speed" Model-building competition, in which 100 stamps were offered as prizes for each of the first three boys to finish their models; and a special Meccano Week during which the local Meccano dealer's window was used for a display of models built by members. A model was loaned from headquarters for the occasion. All members are very keen and steady progress is maintained. Leader: Mr. Peter Thomson, 106, Queen Street, Castle Douglas, Scotland.

West Bridgford M.C.—Electric current has been installed in the club-room building. All the wiring of the building, which is a two-storey one with eight rooms, has been carried out by the boys, working by gaslight on meeting nights. The Hornby Electric Trains can now be run from the house supply. Lantern Lectures are held weekly. Club roll: 18. Leader and *Secretary*: Mr. N. C. Whitehead, Y.M.C.A., Mansfield Road, Nottingham.

Meccano Club Secretaries

No. 8 Alfred E. W. Ward



Mr. Alfred E. W. Ward is Secretary of the Harwich Meccano Club and has filled this position with great success since the formation of the club in 1924. During this period he has co-operated loyally with the enterprising Leader, Mr. A. S. Hogg, in bringing the club to its present flourishing condition.

A notable feature of Harwich M.C. is its varied syllabus. In addition to the usual model-building and games, Plasticine modelling, fretwork, enamelling, stencilling, drawing, painting and carpentry are included, the various sections being presided over by sub-Leaders.

Heswall M.C.—Weekly meetings are being held this year instead of fortnightly ones as last year. Mr. A. P. Ludeck now has the co-operation of Mr. Leonard Burke, and these two gentlemen work as joint Leaders. It is proposed to commence a Football Team to play friendly matches with other local teams. *Secretary*: G. Birch, The Cot, Tower Road, Heswall.

Ruddington M.C.—This club has just been affiliated with the Guild. It was formed by a small band of enthusiasts several years ago, and has been pluckily carried on in spite of being handicapped by the absence of a suitable Leader. The interest of Mr. J. H. Bosomworth was recently gained, however, and under his guidance the club was granted the well-deserved privilege of affiliation. Club roll: 9. *Secretary*: T. Dickens, The Red House, Manor Park, Ruddington, Notts.

St. George's M.C.—This club lost its Leader some time ago, but now under the Leadership of Mr. Ernest S. Weffer good progress is reported. Special sections are being formed for Woodwork, Fretwork, Model-building, etc. Members have been invited to attend a social evening organised by Mr. R. H. Bentley, in connection with Christ Church M.C. Inter-club matches of draughts and dominoes are being arranged. Club roll: 40. *Secretary*: Charles Jerram, 63, Boundary Road, London, E.13.

Boston Model-Making M.C.—Is progressing along sound lines and the syllabus includes Fretwork, Billiards and Model-building. A Committee of four members has been appointed. The Leader is endeavouring to arrange to erect a tablet for one of the members whose sad death some little time ago was deeply regretted by his old colleagues. Leader: Mr. J. E. Sharman, 11, Glebe Terrace, Skirbeck, Boston.

Meeson M.C.—Has now become affiliated with the Meccano Guild, and promises to be a very successful club. Regular meetings are held and in addition to the usual syllabus members are taught Toy-making by the Leader, Mr. A. J. Wilcox. Club roll: 50. *Secretary*: A. Baker, 4, Bristol Road, West Ham, E.15.

St. Saviours (Tonbridge) M.C.—A special Recruiting Month is being organised, and it is hoped to effect a substantial increase in the club-roll. The newest addition to the club is a Girls' Section which promises to be a great success. Its Leader is Miss Golding, Bingleaves, Dry Hill, Park Crescent, Tonbridge. A new list of club rules has been drawn up and a large copy is to be painted and hung in the club-room. Club roll: 30. *Secretary*: C. F. Copper, 91, Shipbourne Road, Tonbridge.

Tenterden M.C.—A good membership is being maintained although several boys have left the district, and are endeavouring to form another club. The Leader, Mr. Clare, recently delivered a very successful Lecture on "The Story of Meccano, its beginning and growth," giving the members a good knowledge of the history of the hobby upon which their club is founded. A regular course of Model-building is maintained. *Secretary*: Arthur Nicholls, The Creamery, Tenterden.

Middlesbrough M.C.—The Table Tennis Championship is being keenly contested. Blow-football contests also are very popular, and the club library is well patronised. Model-building competitions are held frequently, marks being awarded and a prize given to the boy holding the highest total at the end of the session. A debate on "Which is more useful, the Aeroplane or the Ship," resulted in a vote in favour of the ship. New features to be introduced include a Social Evening at which each member will entertain the club, a Drawing Evening, a Musical Evening, a Hobbies Evening, Mock Trial and Model-building Race. Club roll: 45. *Secretary*: A. Bradley, 23, Laurel Street, Middlesbrough.

Haslingden Secondary School M.C.—Meetings are well attended and it is hoped to organise a Concert and Exhibition for Christmas. An interesting visit was made recently to the Metropolitan Vickers' Works. Chess, Draughts, and Table Tennis Tournaments are keenly contested and several very good Lectures have been delivered by patrons of the club. Mr. A. Lodge, M.Sc., Headmaster of the school, has accepted the position of club President. Club roll: 32. *Secretary*: K. G. Tupling, 16, Alexandra Terrace, Haslingden, Rossendale, Lancs.

Rhos-on-Sea M.C.—Has an interesting syllabus comprising Model-building, Lectures, Rifle Shooting, Hornby Train nights, Indoor Sports nights, and special nights for games. The meeting night has been changed from Friday to Saturday, the latter being more generally suitable. It is hoped to arrange some football matches. Club roll: 30. *Secretary*: G. E. Mellor, "Bradda," Allanson Road, Rhos-on-Sea, Colwyn Bay.

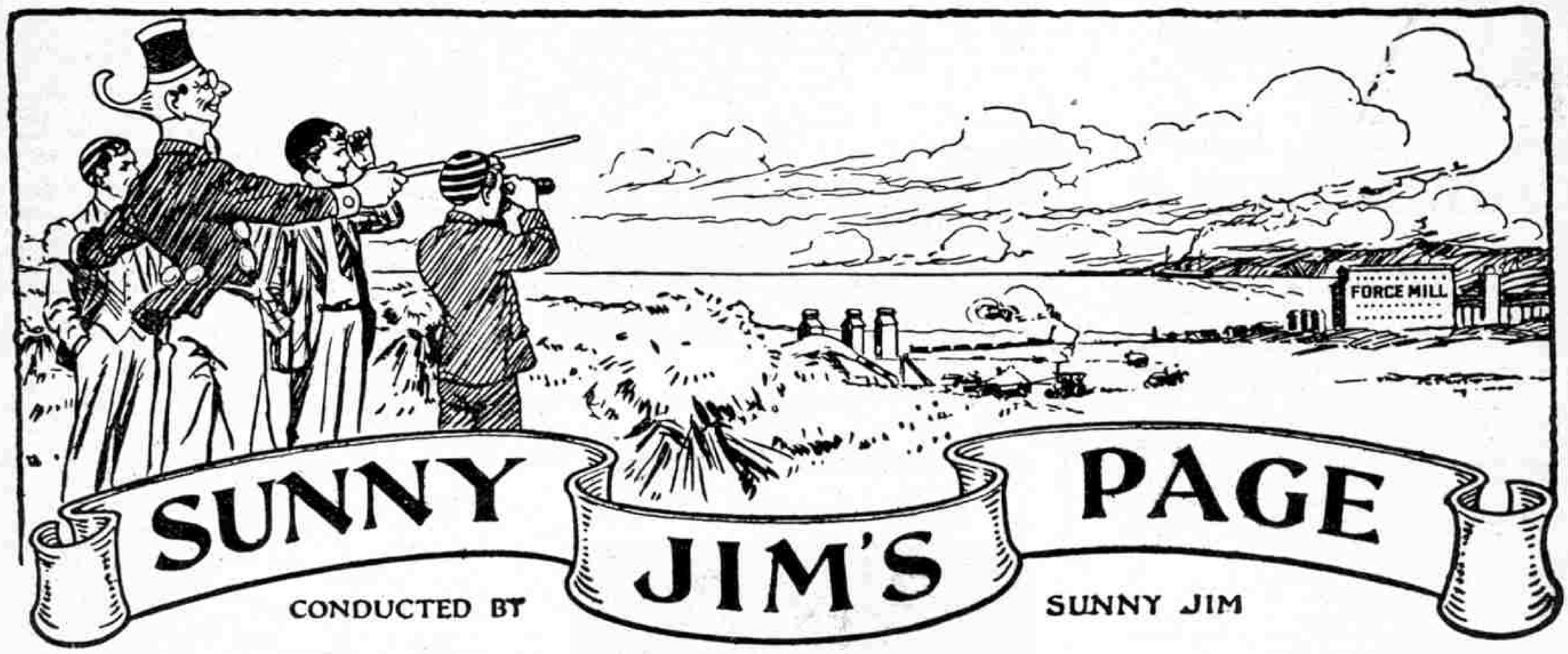
St. Annes (Bristol) M.C.—Regular meetings are held for Model-building and Games and the attendance is increasing. A special Drawing Competition was recently held, the subject being a complicated model. Several interesting Lectures have been delivered, and recent novelty evenings included the display of a model containing a number of mistakes, the members being required to find as many as possible; the construction blindfold of a simple model; a paper chase by flashlight, and a reading night. Club roll: 25. *Secretary*: J. Davis, 45, Arlington Road, St. Annes Park, Bristol.

Annan M.C.—Is making good progress, Lectures and Model-building being very popular. A Lecture delivered by H. Shaw on "The Conquest of the Air" was well received. A visit to a local Engineering Works took place recently, and several general games nights have been held. Club roll: 19. *Secretary*: O. Gibbs, 6, Adison Place, Annan.

Stockton-on-Tees M.C.—Games Nights, Contractors' Nights and Wireless Nights are popular features of the syllabus. An Exhibition was held recently, the members of Middlesbrough M.C. being invited for the occasion. Club roll: 25. *Secretary*: N. Middleton, 14, Victoria Avenue, Norton Road, Stockton-on-Tees.

Derby M.C.—Several patrons have delivered good Lectures, Mr. Smellie discoursing on "Indian Railways," and Mr. W. Steer contributing a talk on "Ancient Mechanical Contrivances." Hornby Train and Meccano Nights and Impromptu Speech Meetings are held frequently, and a Social is being arranged. Club roll: 35. *Secretary*: P. H. Speed, 5, Findern Street, Derby.

Skelmanthorpe Wesleyan M.C.—Sound progress is being made and the membership shows a steady increase. Meetings for Model-building Competitions and Games are held regularly, and members are very enthusiastic. Joint Leaders of the club are Mr. D. Taylor and Mr. G. Jackson, and Mr. Thomas E. Field is the President. Club roll: 48. *Secretary*: Mr. R. Gordon Field, Pilling House, Skelmanthorpe, Nr. Huddersfield.



A MODEL THEATRE FOR YOUR XMAS PLAY

Boys! Let's have a real exciting Christmas. Plan all sorts of stunts and things to do. Let's have games, let's make things, let's make a theatre with our Meccano sets. We can do it.

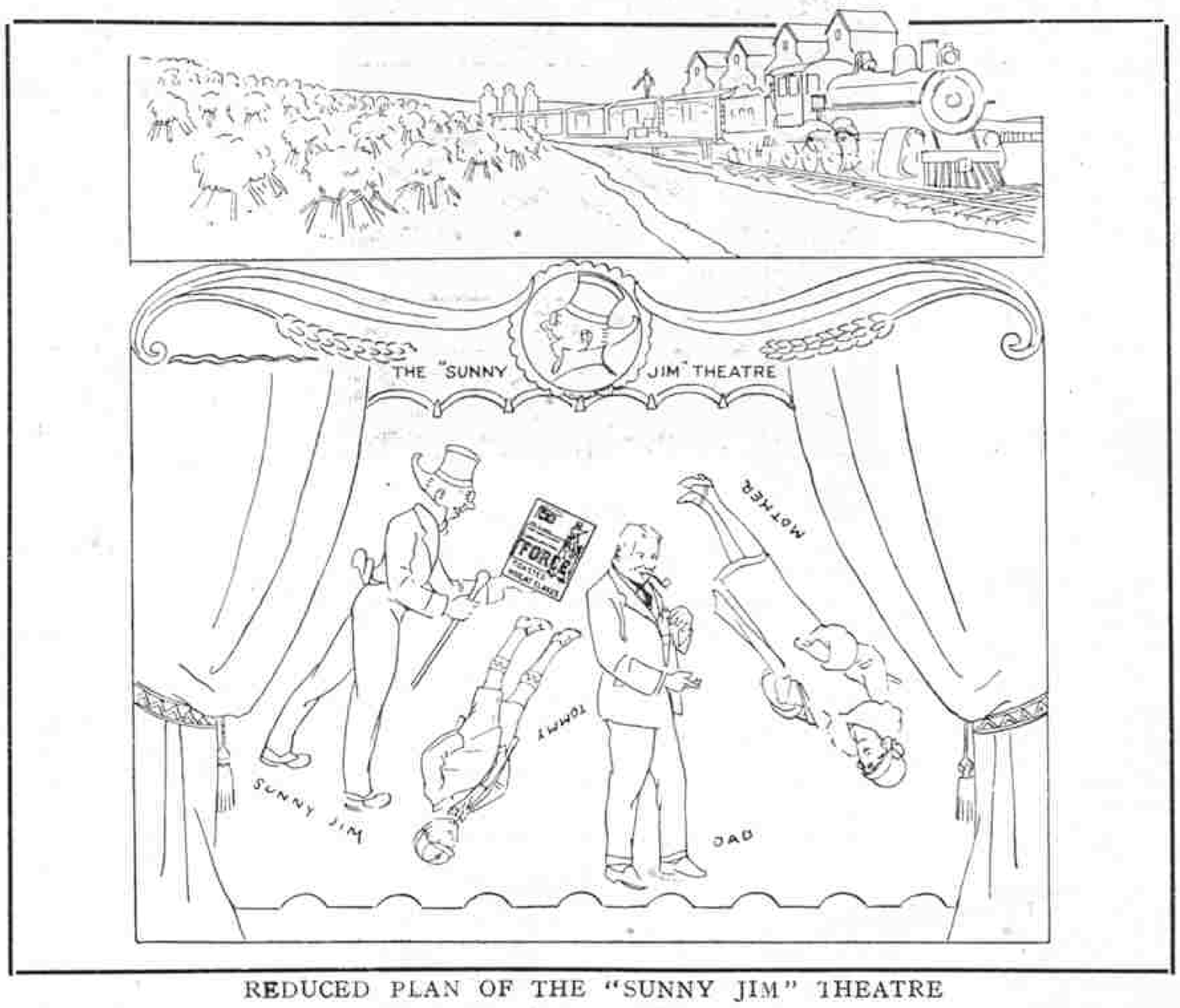
On this page you will see a small reproduction of a plan which I have drawn, from which you will be able to make a model theatre. Here you have the "proscenium," four characters, and a picture for the background. The plan has been prepared so that any boy can make up this theatre, but you, with the advantage of your Meccano set, will be able to improve on the instructions which are given.

At the bottom of this page is a little form which has been printed for your convenience. Just sign your name and give your address and post it to me, together with the top from a "Force" packet. There is nothing to pay at all. When I get this from you I will send the plan to you all ready to paste down on to cardboard, colour with your water-colours or crayons, and cut out.

The four figures, of course, will be coloured any way you like, the picture of myself being in the familiar bright red coat and white trousers which I am wearing while I write these words.

Let us imagine that you have followed out the instructions and have made up your little model theatre; your four characters—Mother, Father, "Sunny Jim" and Tommy are all ready for work. What are you going to make them do? You need not worry about this because on the back of the plan which you receive there is a Play already written out for you. Before you paste the plan down on the cardboard you will copy out this Play on to a piece of paper, and so will now be ready for the fun. I shan't tell you what the Play is all about, as this would be giving too much away, and we want the Play to be a surprise, don't we?

When all is ready, invite your friends, not forgetting Mother and Father, and show them how well you can produce a Play. Of course, before the Play starts we must have an overture from the orchestra. You will be able to do this easily if you are a musician and can play a musical instrument. The talking parts of the characters will, of course, be spoken by yourself, either alone or with the assistance of your friends.



REDUCED PLAN OF THE "SUNNY JIM" THEATRE

A jolly good idea before the show starts would be for you to give a talk all about your theatre. Tell your audience how the model was made and why you and other Meccano boys are all so keen on everything to do with "Force." Your talk might go something like this:—

"Ladies and Gentlemen—Allow me to introduce to you "Sunny Jim's" Theatre. With the help of this model I intend to produce a Playlet, entitled—(here you give the title). The theatre is entirely home made, except for the pictures which were drawn by Sunny Jim.

"The scene which you will see in the background depicts a Canadian Harvest, and shows the wheat from which "Force" is made. Sunny Jim has taken it for granted that you all know that "Force" is made in Canada because, amongst folks like us, "Force" is already a familiar object on the breakfast table. Both Sunny Jim and I now have pleasure in submitting this production for your amusement." (Now pull up the curtain and commence the Play).

Have you tasted Holforce yet? These squares of nourishment are sold by grocers for 6d. a packet.

THE "SUNNY JIM" THEATRE PLAN IS FREE. SEND THIS COUPON TO FETCH IT!

POST TO "SUNNY JIM," ADDRESS BELOW.

To SUNNY JIM, 197, GT. PORTLAND ST., LONDON, W.1.

Dear Sunny Jim,

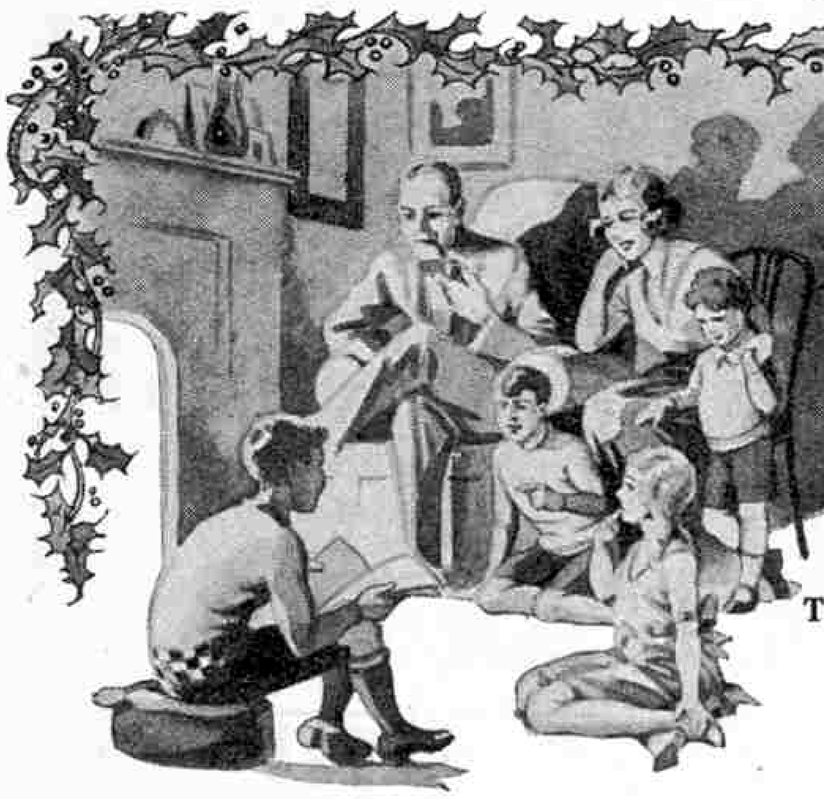
Send me one of your free Model Theatre plans with instructions for making it up. I enclose a "Force" packet top as you request.

NAME .....

ADDRESS .....

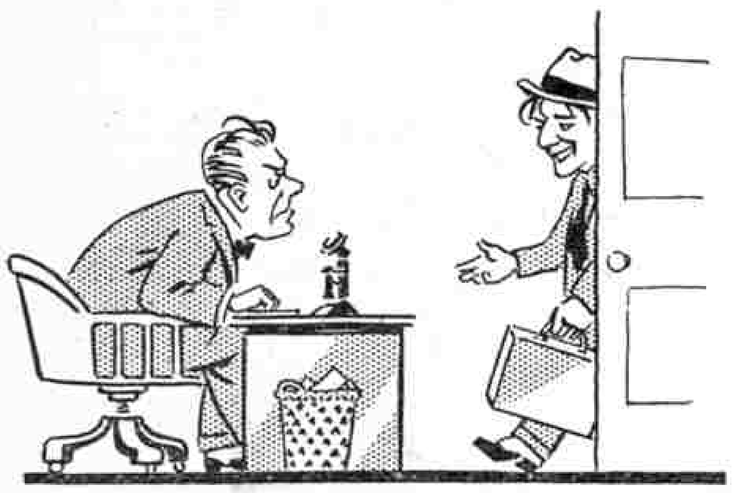
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Fireside Fun

PERSISTENCE PAYS!



Three times the business man threw the determined "commercial" down a long flight of steps. The third time he turned to his work, quite satisfied that he had seen the last of the persistent one. But no! The door opened, and a smiling face peered in. "Well, now," said the traveller, "we have had our little bit of fun together. Joking aside, what about an order?"

* * * *

A Scotsman sold a racehorse to a Jew for a hundred pounds. It died overnight, but the Scot put it into a horsebox and sent it off, and to his surprise got his money. When next they met, the Scot cautiously expressed his surprise.

"Ah, well, you see, it was thith way," replied the Jew, "I raffled it; ten tickets at £15."

"But what did the man say who won it?"

"Oh, I just told him the horse had died and gave him his money back. You see, I'd got the money of the other nine!"

* * * *

THE TRUTH AT LAST!

Angry wife (addressing husband, and waving saucepan that has boiled dry): "Too much trouble for you to watch it, I suppose; sitting there like King Alfred, looking for winners, while the bottom of the saucepan burns out."

* * * *

Teacher (to class of small boys to whom she is teaching Christmas carols): "What do we mean by "Hymns of Adoration?"

Small Boy: "Please Miss Brown, hymns that we sing outside a door."

* * * *

Paddy was showing some visitors over his house. Arriving at the nursery he remarked: "This, gentlemen, is the bawl-room."

* * * *

An optimist is a man who tries to save our forests by shooting woodpeckers.

This Month's Short Story:

There once was a bonnie Scotch laddie,
Who said as he put on his plaidie:
"I've just had a dish
O' unco' guid fish."
What had 'e had? Had 'e had haddie?

* * * *

Johnny had done those things that he ought not to have done and, being wise in his generation, had placed a book in the seat of his trousers before proceeding to the front of the class for punishment. "Now," said his teacher, "you and I are going to do a little performance together." "Yes, sir," said John, "and I have booked my seat!"

* * * *

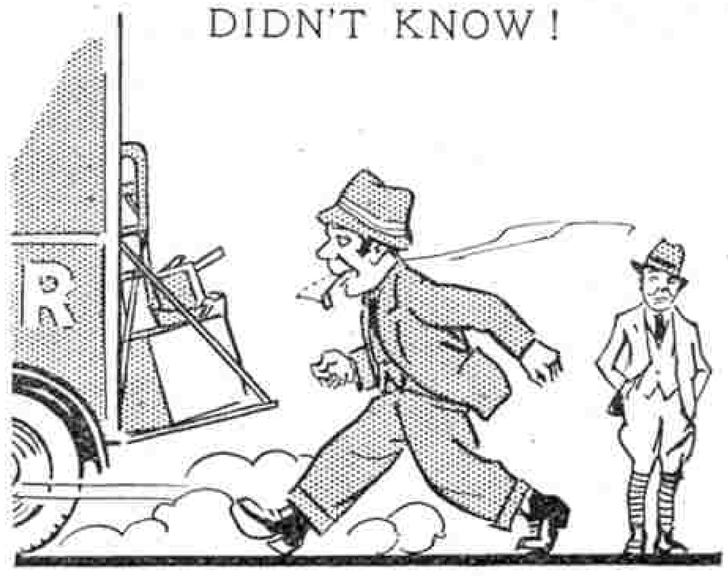
Boy: "Dad says will you lend him your gardening tools?"

Polite old gentleman: "Haven't you forgotten something, my boy?"

Boy: "Oh yes, he also said, 'if the old blighter refuses, try next door!'"

* * * *

I DIDN'T KNOW!



An Irishman, whose wife was fond of moving from one house to another, was met by a friend while walking behind a vanload of household goods.

"Halloa, Mick, shifting again? Where might you be going this time?"

"I don't know," said Mick. "I'm following the furniture to find out."

* * * *

TUT-TUT!

Teacher: "Tommy, can you tell me how iron was discovered."

Tommy: "Yes, sir; I heard papa say the other day that they smelt it."

* * * *

A fellow said to a famous sprinter: "I'll race and beat you if you'll let me choose the course and give me a yard start."

"Ten pounds to one that you don't," said the sprinter confidently. "Name your course."

"Up a ladder," replied the challenger.

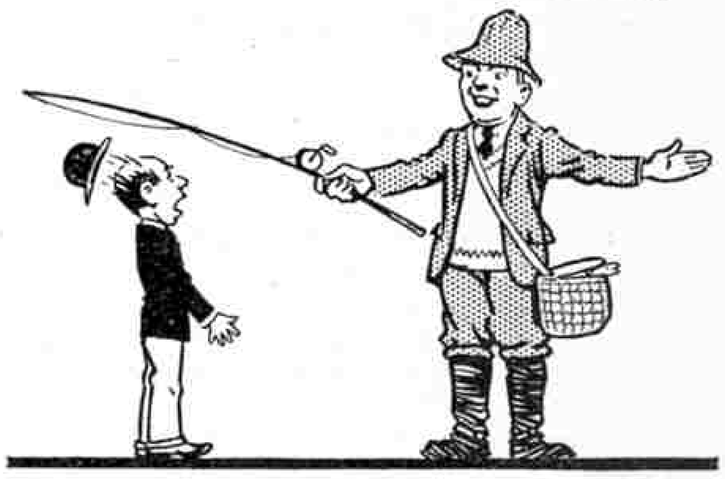
* * * *

Superior looking African: "I want some peppah."

Store Assistant: "What sort? White, black, or Cayenne?"

Native: "Peppah—writing peppah!"

HEAVIER IN THE SCALES!



"Do fishes grow fast, Jimmie?"

"Some of them do. My father caught one last year that grows an inch every time he tells anybody about it!"

* * * *

Pat and a professor were out on a lake in a rowing boat.

"Pat," asked the professor, "do you know any physiology?"

"No," replied Pat.

"Then there's half your life gone. Do you know any biology?"

"No."

"There's another quarter of your life gone."

Here the rowing boat overturned and threw Pat and the professor into the lake.

Pat: "Do you know any swimming-ology?"

Professor: "No."

"Then there's *all* your life gone," replied Pat as he turned and swam ashore.

* * * *

Bagpipe playing was the greatest thing in his life. One night when he was strutting about the room, making a terrific noise, his wife tried a mild protest.

"Jamie," she ventured, "you are making an awful din."

"Sorry, darling," he replied, as, obligingly, he sat down and took off his boots before resuming his playing.

* * * *

IMAGINARY!

About thirty small boys sat in a state of utter boredom while the teacher stood in front of a map and made remarks about unimportant facts.

In these circumstances the unexpected entrance of the inspector was almost in the nature of a relief to the weary youngsters.

"Now, my little man," said the inspector to Jimmy, "can you tell me what the Equator is?"

"Yes, sir," said Jimmy. "It is an imaginary line drawn around the world."

"Quite right. Now let me see whether you really understand what that means. Could you, do you think, tie a knot in the Equator?"

"Yes, sir!"

"Could you, indeed?" asked the inspector in a very sarcastic tone. "And what sort of a knot?"

"An imaginary knot, sir!"

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Stamp Collecting

WINTER SCENES ON STAMPS

By R. Kay Gresswell

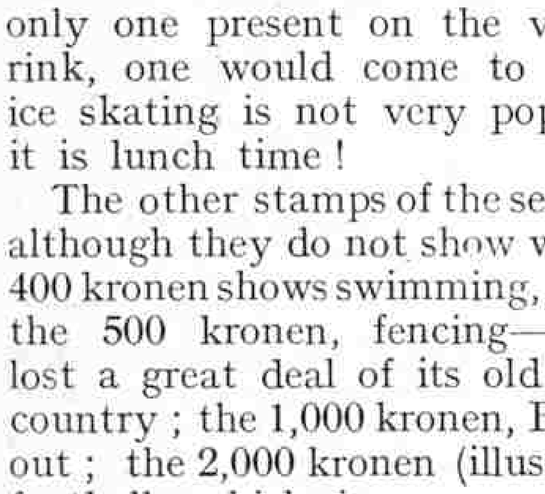
WITH the approach of Christmas and the colder weather the thoughts of stamp collectors may seasonably be directed to those stamps that are connected in some way with winter and Christmas.



The sporting series of stamps issued by Hungary in 1925 in aid of various sports' associations shows several winter sports in progress. The 200 kronen value, which is illustrated on this page, shows a keen Alpinist ski-ing across the mountain side. This value is in green and brown and makes a most handsome stamp. The 300 kronen, deep blue, shows ice skating in progress while in the background is a pavilion. Judging from the fact that the skater in the foreground is the only one present on the visible portion of this huge rink, one would come to the conclusion that either ice skating is not very popular at this resort or that it is lunch time!



The other stamps of the series are interesting, although they do not show winter scenes. The 400 kronen shows swimming, diving and boating; the 500 kronen, fencing—a sport that has lost a great deal of its old popularity in this country; the 1,000 kronen, Boy Scouts camping out; the 2,000 kronen (illustrated on page 793) football, which is apparently as popular in Hungary as it is in Britain; the 2,500 kronen, the highest value, hurdling in progress; and the 100 kronen, the lowest value, shows athletes marching past a grandstand at some games festival. This series forms a very handsome addition to any stamp collection and its present popularity will probably make it quite scarce in the course of a few years. It would be rather a good series to give as a Christmas present to some keen sportsman whom one wishes to make a stamp collector.



Prisoners in Siberia

All the stamps were sold at double their face value and the inscription "A 100%-os felár testnevelési célekra fordittatik" printed in black on the back of each stamp informs the purchaser that this is so. Incidentally it is interesting to notice that these are the last stamps of Hungary to be issued with the values in "kronen," since with the new issue this year the currency appears in "filler," one hundred of which are worth one "pengo."



This is not the only series of stamps issued by Hungary that shows wintry scenes, for a charity issue intended for the benefit of Hungarian prisoners of war in Siberia was issued in 1920 and shows a prisoner tramping through the snow and a blinding storm. This is on the 40 filler value on which there was an extra charge of one korona for the prisoners. The other two values of this set show, on the 60 filler, prisoners behind barbed wire fencing and, on the one korona, a prisoner being welcomed home by his wife and family.



The Bogus Issue of Azerbaijan

A view that reminds one of a Christmas card is shown on the 10,000 roubles stamp labelled "Republique d'Azerbaijan" illustrated here. This stamp, as well as the other bearing the same title and showing a bear asleep in the hollow of a tree, is entirely bogus, that is, it has never been issued by the government of Azerbaijan or by any other government. It is a series of labels printed by a group of men in Italy with the intention of defrauding stamp collectors by selling them on the pretence that they are real stamps. The complete series, of which we give two illustrations, consists of six stamps.



It will perhaps be useful in helping our readers to avoid buying these stamps if we give a brief description of each value. The 500 rub., carmine, shows the portrait of an old man with a long beard, the

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FOR STAMP ADVERTISEMENTS SEE ALSO PAGE 815

1,000 rub., slate-green, a bridge over a stream with hills on either side, reminding one rather of many Welsh and English Lake District views, the 2,500 rub., emerald-green, a bear on a tree (illustrated), the 5,000 rub., orange-yellow, a shepherd tending his sheep, the 10,000 rub., deep blue, a snow-clad slope (illustrated), and the 25,000 rub., bronze-green, an oilfield, with several petroleum wells and a lake of water (or perhaps of oil) in the foreground.

These stamps are all perforated and are all 36 mm. × 29 mm. They are quite unlike any genuine stamps of Azerbaijan and it might be noted that all the latter are unperforated while the bogus stamps just described are all perforated.



The "Christmas Card" of Liechtenstein

Another stamp that reminds one of Christmas Cards is one of a series issued by the interesting little principality of Liechtenstein. This district is the smallest independent state in Europe after San Marino and Monaco, and is situated between Switzerland and Austria, its northern boundary being about fifteen miles south of Lake Constance. It is about twelve miles in length from north to south and about six miles in width at its broadest part. The chief town is Vaduz about two miles from the nearest railway station.

The district was raised to the importance of a principality in 1719 by the then Roman emperor, of whose empire it formed a part until 1806 when it became independent. It did not remain so for long however, for it joined the German Confederation in 1815 but when this was dissolved in 1866 it became independent again. Since that time it has not acknowledged any overlordship. It was nevertheless intimately connected with Austria until the war.

During this time of strife Switzerland supplied it with foodstuffs and Swiss stamps were used for some months. In fact, the postal system, together with the telegraph and the telephone systems, is now amalgamated with the Swiss systems instead of with the Austrian systems as was the case before the war. Prince John, who has been ruler since 1858, celebrated his 86th birthday on the 5th of October this year.





In 1920-1921 the principality issued a series of view stamps of various designs and it is one of these especially that shows what in this country is regarded as being a very wintry scene. The stamp is illustrated here and it shows what may be a church with its roof covered with snow, while behind and before are snow covered slopes. This stamp is one of the 1920 issue and like the rest of the stamps in the series, the view is contained in an artistic frame surmounted by a crown. In 1924-26 Liechtenstein issued four interesting stamps, one of which shows the Castle of Vaduz which is now in ruins.



Mails Carried Through the Snow

In 1903 Roumania issued a series of stamps that it had been intended to put on sale two years earlier in order to commemorate the opening of the new Post Office in that year. The series, however, was not ready at the appointed time and it was not until 1903 that it was eventually issued to the public. There were two types and the values between 15 bani and 50 bani appeared in both. One of these is illustrated here and shows four rather wild looking horses, drawing at a great speed a wagon of very simple construction through snow covered ground. Riding on one of the horses is their driver who carries a long whip. When we look at the cart we expect to find its passengers to be some members of royalty making a romantic escape from some wicked person, but instead we find that it merely contains a number of mail-bags! Certainly there is a soldier with fixed bayonet also on board, but this by no means compensates us for our disappointment.

The stamp was designed to impress upon its users how speedily their letters were carried and how well they were guarded. It was engraved by Thereuin and printed at the French Government Printing Works, Paris, on pink-surfaced paper with no watermark and perforated 14 × 13½ between the stamps.

There is another Roumanian stamp design that is more or less appropriate for this time of the year, and that is one used for each of four values in the 1907 charity series of stamps issued in aid of two charities the "Policlinica" and the "Tesatorea," in which the Queen of Roumania was specially interested.

The design shows Princess Maria and her children receiving a poor ragged family that has been conducted to her by an angel. It is symbolical of charity and especially of alms-giving and of aiding the poor. On this account it is, of course, especially suitable for Christmas time, which is the great season of the year when everyone tries to do something for others less fortunate than himself.

American Winters

There are several cold, wintry scenes pictured on various stamps issued by American countries. In North America, Newfoundland shows seals on ice-floes (1866-1880) and an iceberg off the coast of the island near St. John's. These icebergs are brought down from the north by the cold Labrador current, which in the Atlantic Ocean near this coast meets the warmer Gulf Stream from the south. It is this junction of cold and warm currents that causes the Newfoundland fogs we hear so much about but which are, however, confined to the shores and bays of the south-eastern and southern coasts of the island. Icebergs often become stranded on the famous Banks, where are the fish and which are mostly less than eighty fathoms in depth.

In South America there is the snow-clad Mount Illimani, pictured on the 5c. value of the 1916 issue. It was lithographed by J. Boettger at La Paz and there are two types of the 5c. value, one with the figures of value on a white ground and the other with these figures on a ground of coloured lines. Mount Illimani is just over 21,200 feet in height and is situated towards the southern end of the Cordillera Real, which itself is the northern part of the great Cordillera Oriental which extends from Peru to the southern boundary of the country.

This mountain range is considered to be one of the most imposing mountain ranges in the whole world and, of course, forms a part of the Andes. Mount Illimani itself is a little over 30 miles south-east of La Paz, the capital of the country.

Finally we come to a stamp unlike any that we have already described. This is, we believe, the only stamp that has ever been issued bearing the word "XMAS," and it is the two cents map of the world issued by Canada on the 7th December 1898, to the design of Postmaster-General Mulock. Its purpose was to commemorate the introduction of Imperial Penny Postage. The design was printed in black, the British possessions in red and the seas in blue, of which there are three shades. Across the foot of the stamp, below the words "XMAS 1898," is the inscription "We hold a vaster Empire than has been."

Besides being the only stamp to carry the word "Xmas," it is the only one to show a map of the world and the only map stamp to colour the seas blue and the British Empire red.

Gibbons' 1927 Catalogues

Collectors eagerly look forward to the appearance of Stanley Gibbons' catalogue each year. The 1927 edition is now to hand and is issued in two parts, Part 1 the British Empire (6/6) and Part 2 The Rest of the World (10/–). The two parts are supplied in a single volume in special binding (15/–).

Several changes have been made in the new edition. In the British Empire section, for instance, the list of Australian Commonwealth stamps has been further extended and considerable additions have been made to the Hejaz list. The lists of the North Borneo stamps now include all perforation varieties and it is predicted that many of these stamps will become very scarce, the country having been keenly in demand in recent years. In the foreign section two new countries are listed, Mongolia and Nejd. The Greek Islands have been revised and also the recent issues of Roumania and Russia, the Italian colonies, etc. An entirely new list of the interesting stamps of Denmark is perhaps the most important addition to the new catalogue.

All new issues have, of course, been added in the usual way and the necessary illustrations provided. New blocks have been made in some cases and take the place of the older blocks so that the high standard of the catalogue in the matter of illustrations may be maintained. There is a large number of price alterations.



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Wireless Model Locomotives and Ships, Aeroplanes, Engines, Model Aeroplanes and Airships, Books, cameras, clothes, handicrafts, games, animals, gramophones, and everything of interest to the school boy.

MACTE VIRTUTE, PUER



Grand Stamp Competition, organised by Mr. Fred Melville; Silver Cup Trophies.

The Exhibition will be a mine of interest to all who attend. It will instruct and amuse.

Displays by the Air Ministry, the "B.O.P.," the Boy Scouts' Association and other Royal and National Associations.

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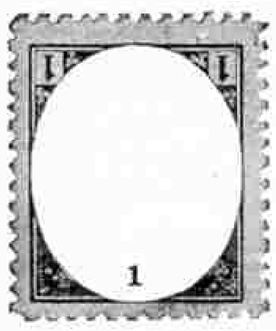


PASSE PARTOUT OUTFITS MAKE IDEAL XMAS PRESENTS

From What Stamps are these Frames Cut?

SECOND STAMP COMPETITION

For the Second Stamp Competition of the new series we are introducing a very novel observation test, which will, we feel sure, prove once again that Meccano boys have exceedingly sharp eyes.

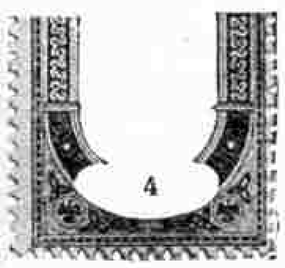

1

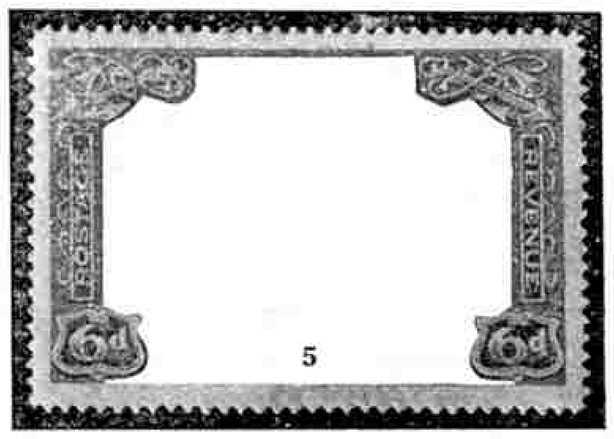
On this page are illustrated the frames of twelve stamps issued by various countries of the world and competitors are required to state the names of these countries. All these stamps have been illustrated at some time or other in the stamp pages of the "*Meccano Magazine*" and readers who are not stamp collectors will be able to compete by looking up their back numbers of the magazine, while collectors will also probably find this a help.



2

The dates of issue of the stamps are not required. Your solution should be arranged with the numbers adjoining the stamps on this page placed in a column down the sheet of paper, and alongside each number should appear what is believed to be the name of the country that issued the particular stamp. Add your name and address at the foot together with a list of the stamps you would like us to send you if you win one of the prizes. There are three prizes, the first consisting of ten shillings' worth of stamps; the second, five shillings' worth; and the third, half-a-crown's worth. All the stamps must be chosen from advertisements appearing in this issue of the "*M.M.*", and we advise readers to study all of them carefully before making their choice. The closing date is 31st December. (Overseas, 31st March, 1927).

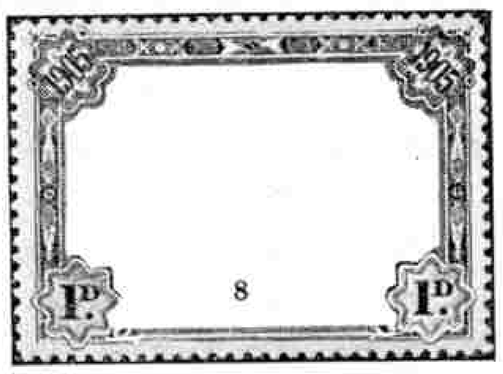

4



5



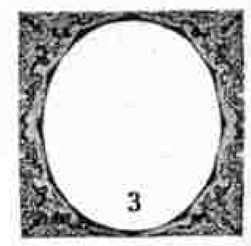
7



8

Stamp catalogues and other books on stamps containing illustrations of stamps may be used, but we trust our readers not to obtain assistance from anyone.

The decorative frame of a postage stamp is perhaps the part that is least noticed in the majority of cases. While it is, of course, not so important, so far as design is concerned, as the central feature, yet it is quite capable of turning a poor design into a good one, and a good one into a poor one. Too much detail must always be avoided and yet excessive plainness is almost as detrimental. The Germania stamps of Germany are quite good in this respect and are greatly superior to the Eagle issue of 1889 that preceded them. In this latter issue, the central design of the eagle is very similar as regards closeness and thickness of lines to the frame, so that there is no distinctive dividing line between the two. The frames of the pictorial issue of Egypt (1914) are excellent. They are simple and neat, they are distinct from the central part of the stamp, from which they are separated by a wide white line, and yet they do provide a finishing edge to the whole stamp. The Sower stamps of France and the Pasteur issues are some of the few stamps with no frame at all, unless the single coloured line round the whole may be termed a frame, and it is difficult to decide whether these can or cannot be considered to be satisfactory designs.


3


6

In addition to the simple duty of being a frame, the frame of a stamp usually carries the various tablets containing the name of the country of issue, the use of the stamp ("Postage," "Revenue," etc.), and its monetary value. These three items are naturally the most important parts of the whole from the point of view of the post office and it is only natural in consequence that in many cases they are made to occupy practically the whole of the stamp.

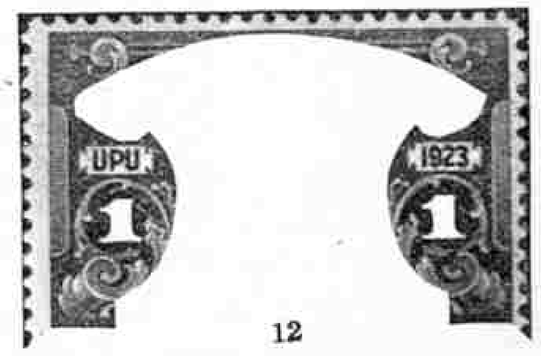
In the case of countries possessing a number of colonies each of which issues its own postage stamps, it has been found economical in many instances for the various series of the different countries to have the same frame design. This enables a saving to be made in printing plates. Examples are to be seen in great profusion in the stamps of the British colonies, the French colonies, the old German colonies, the Spanish colonies, and so on. In nearly all of these instances, the common part of the stamps is printed separately and the special part that is different for each colony is printed afterwards. Thus while this system makes a saving in printing plates there is the added expense of double printing.



9


10


11



12

Stamps printed in two portions, one of which is used for other stamps, are said to be printed from key and duty plates, the key plate being the one used for the several stamps, and the duty plate the special one containing only the name and value and sometimes the central design.

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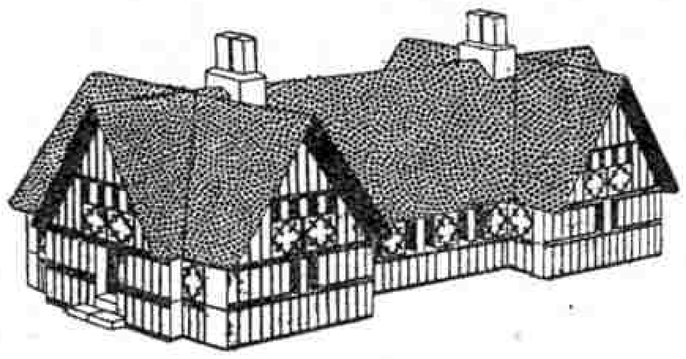
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Every Set is self-contained with Plans, Bricks, Roofs, etc.

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,, 3A (Supplem't) 25/–
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Box 1 ... 4/– and 6/–

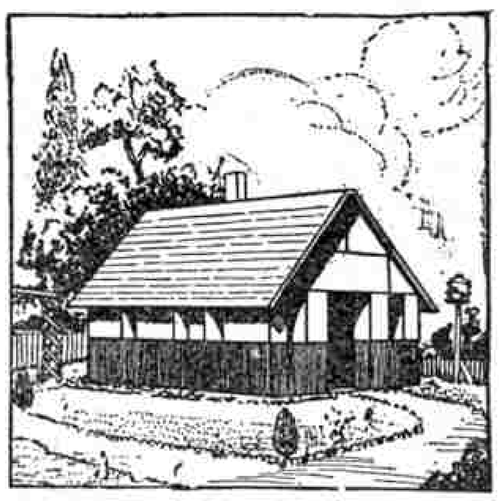
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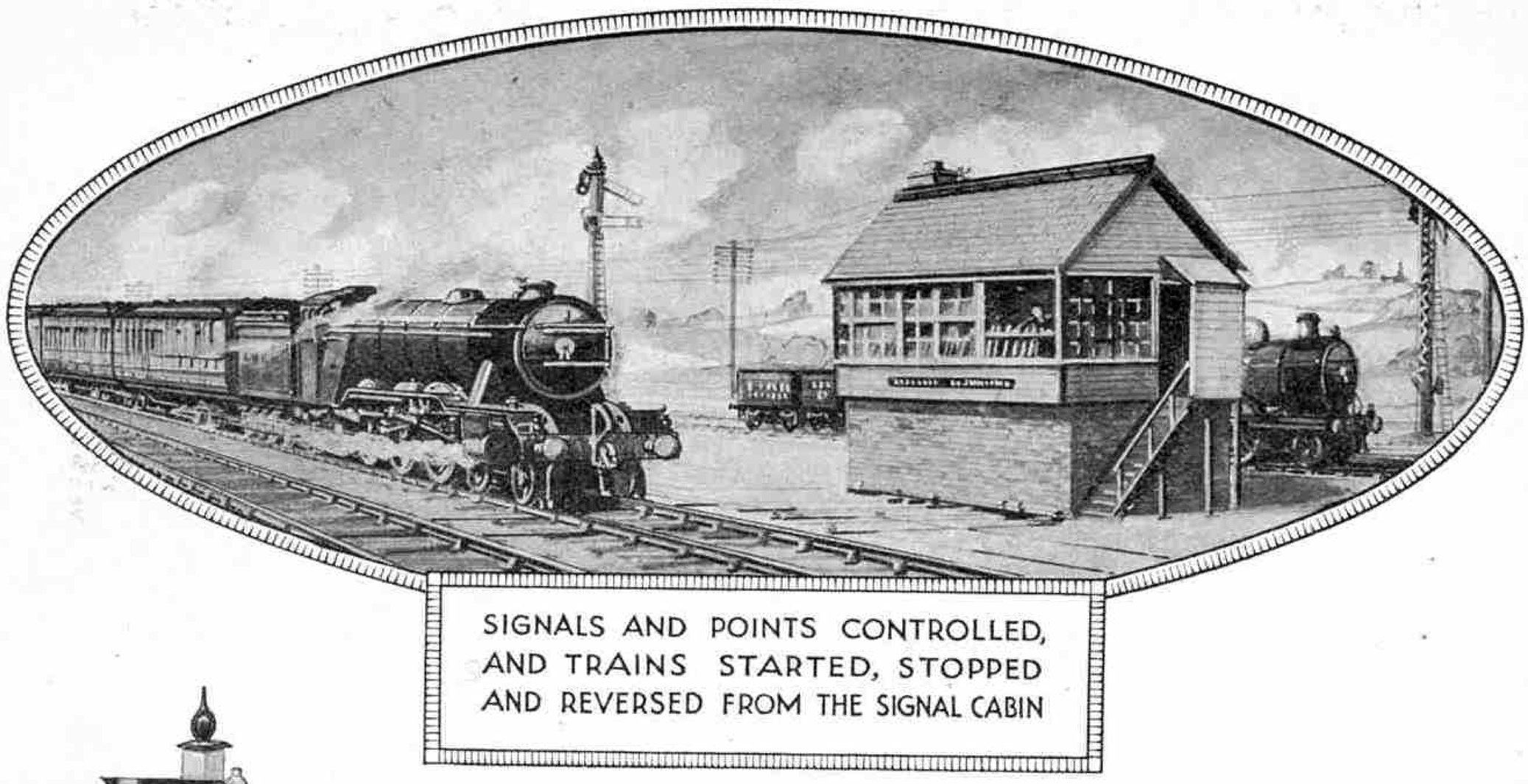
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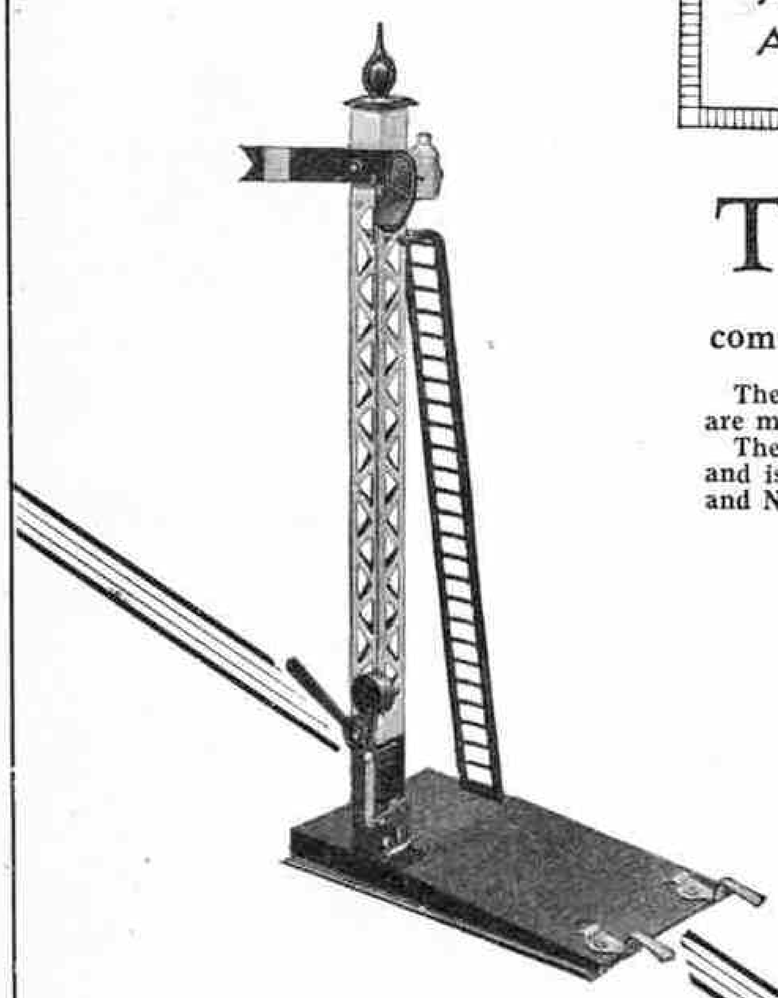
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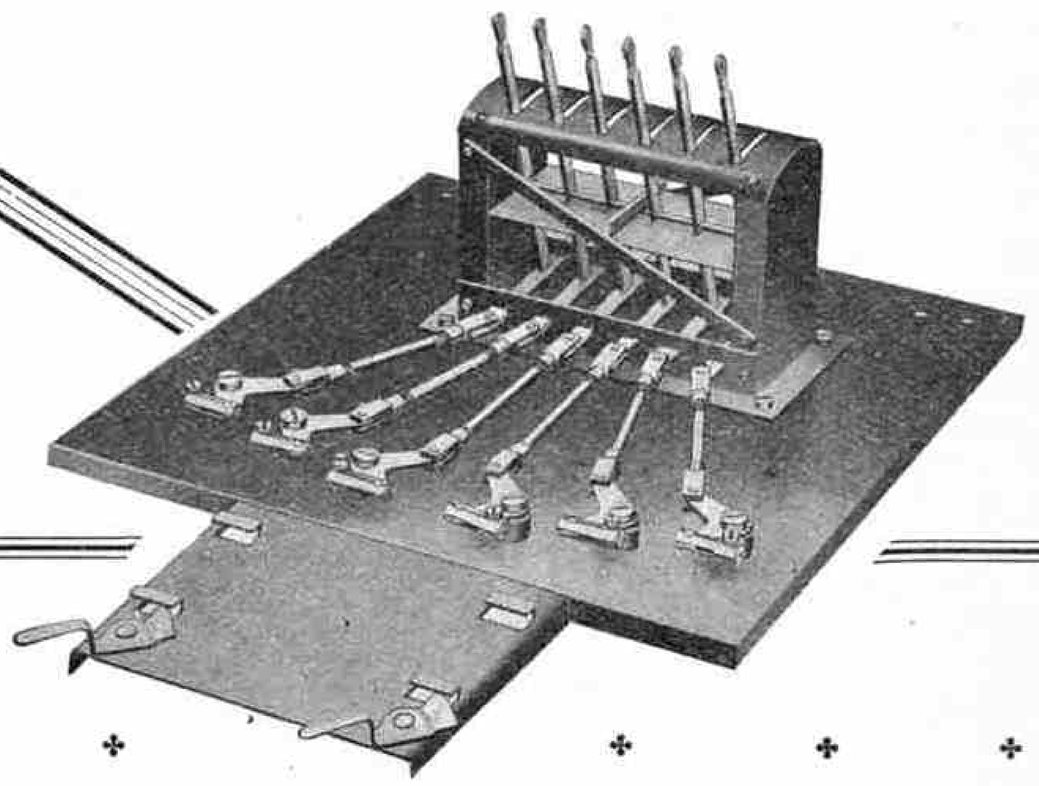
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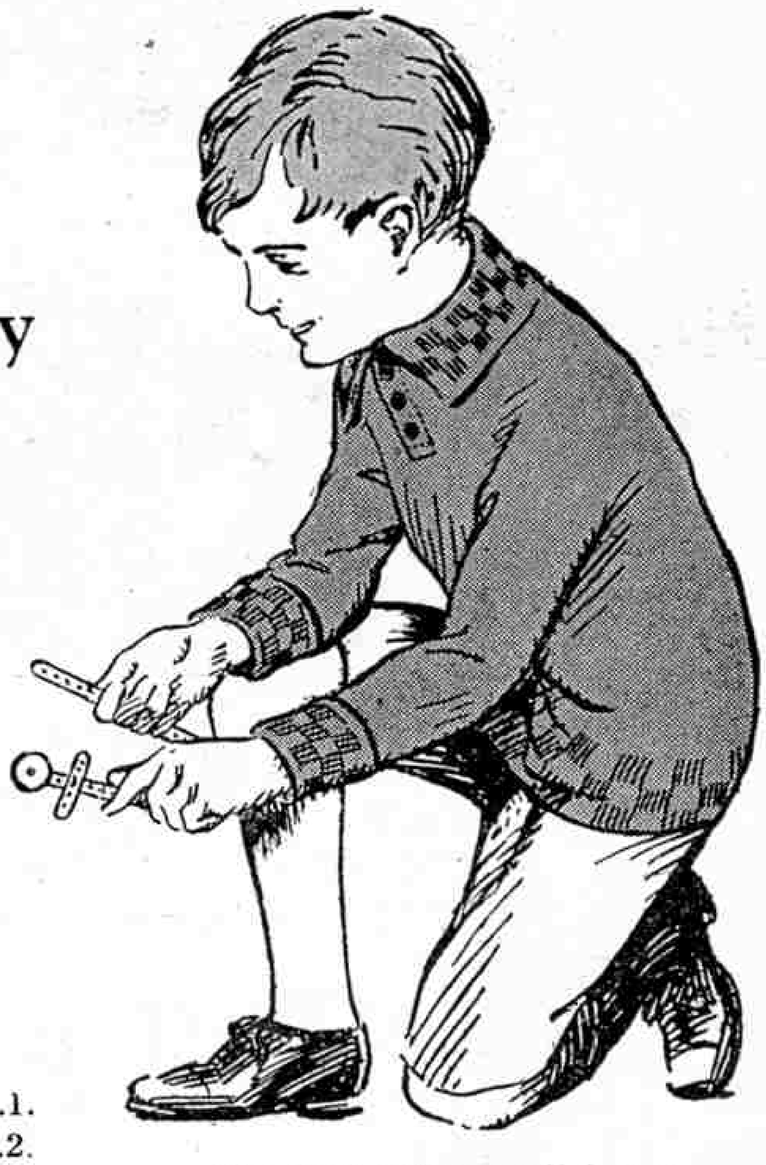
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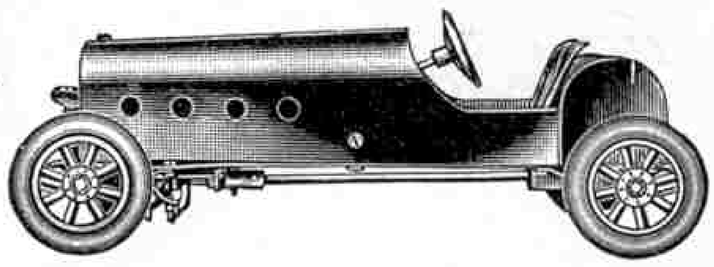
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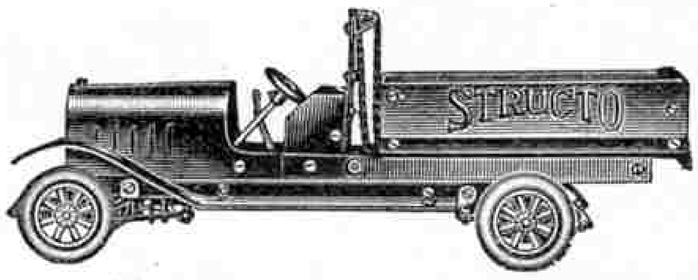
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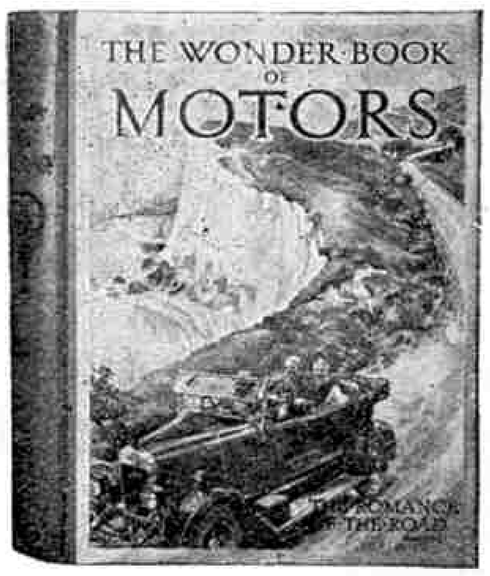
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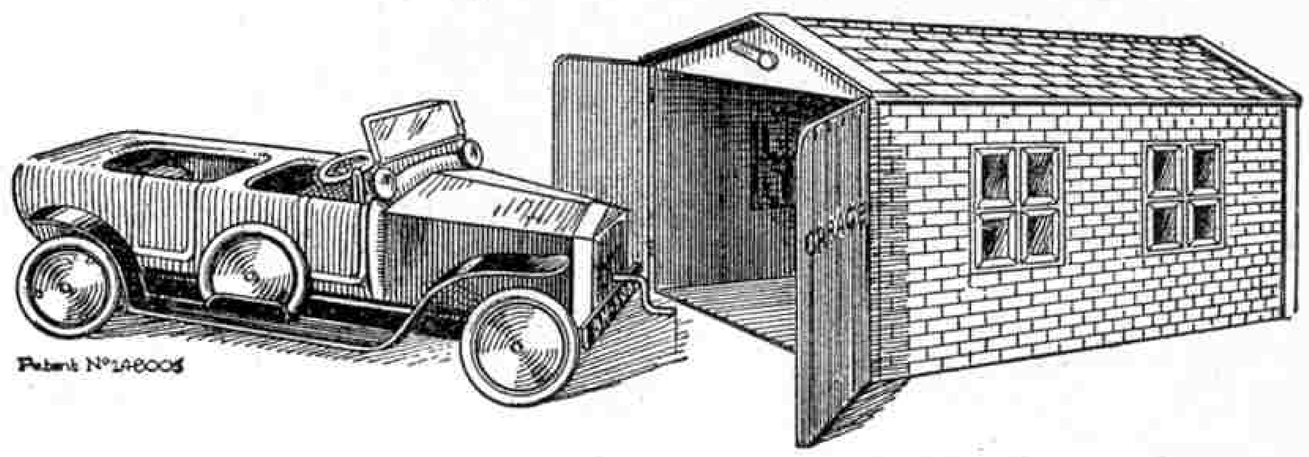
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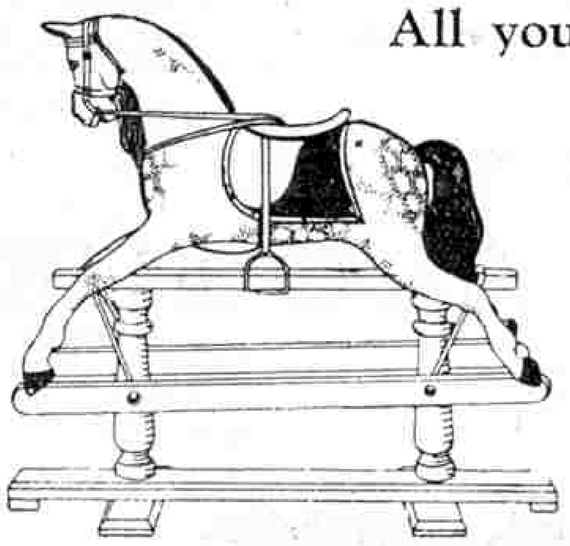
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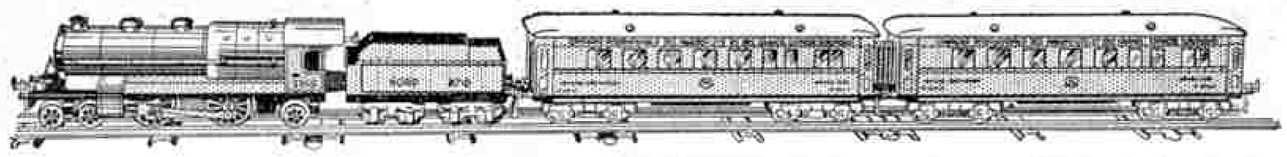


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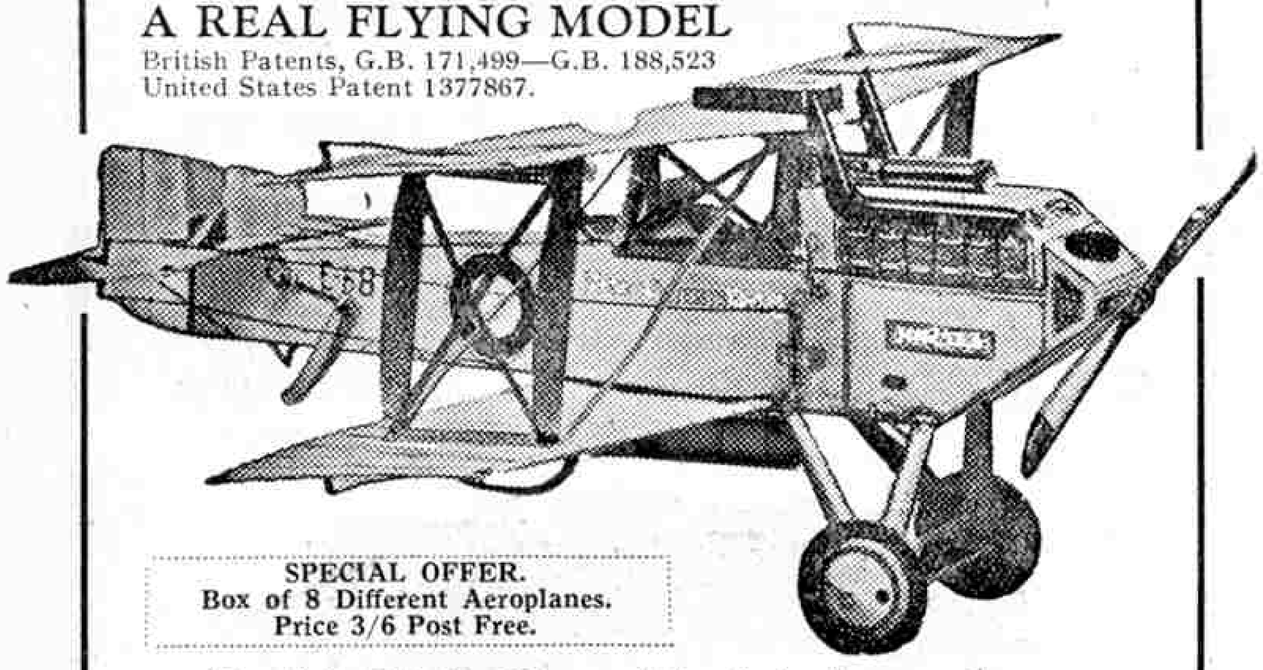
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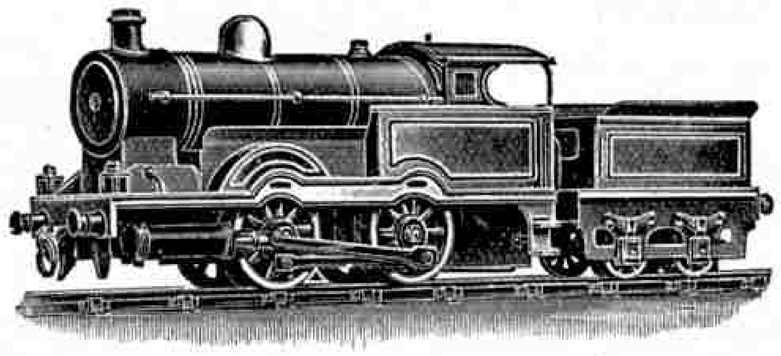
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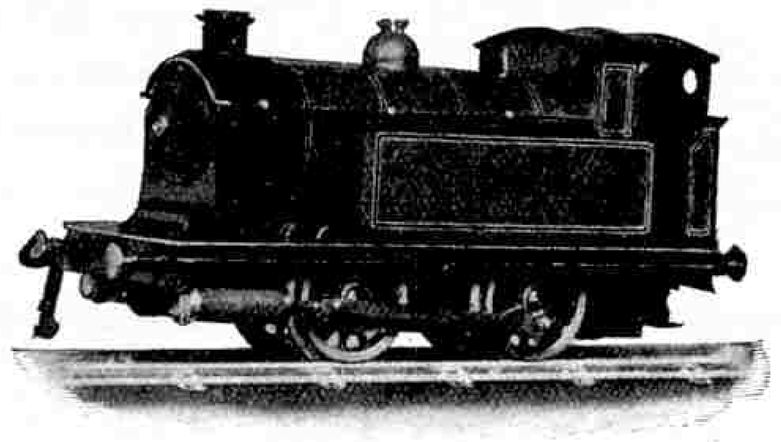
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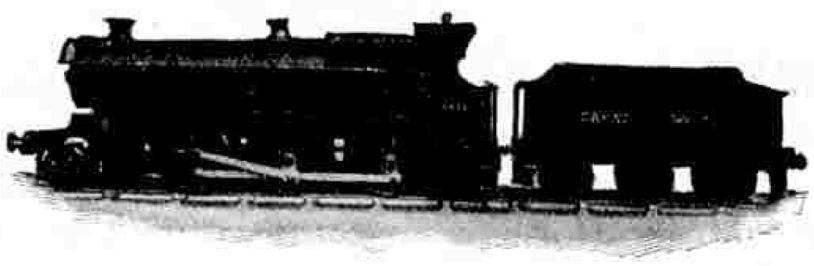
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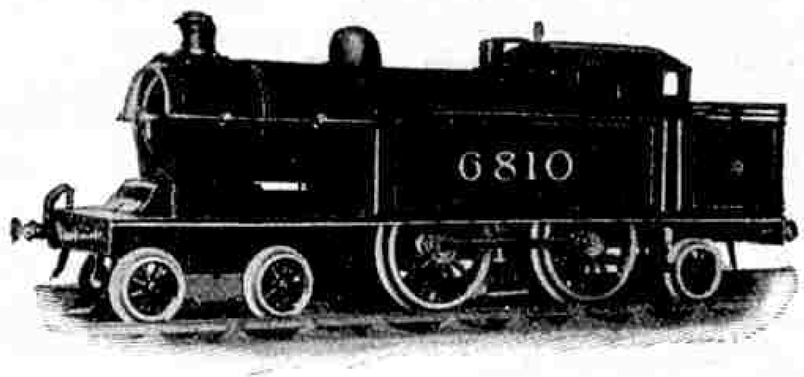
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All Great Western enthusiasts love these powerful engines which are useful for either passenger or goods traffic. The model fitted with powerful clockwork movement, with reversing motion, or our new "Permag" electric motor, working on 8 volts. The steam model is fitted with piston valve cylinders and special type reversing motion from brake or cab.

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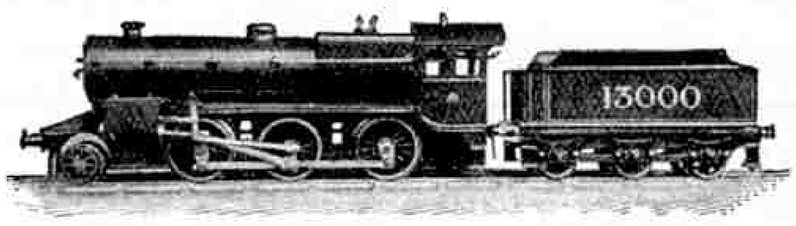
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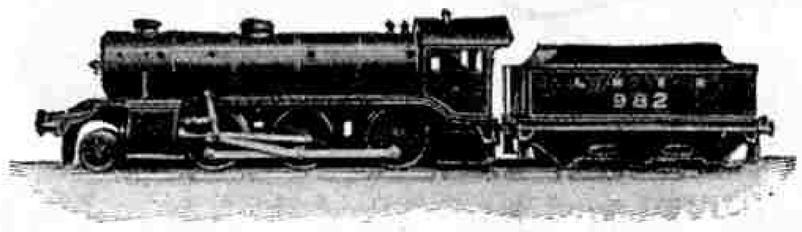
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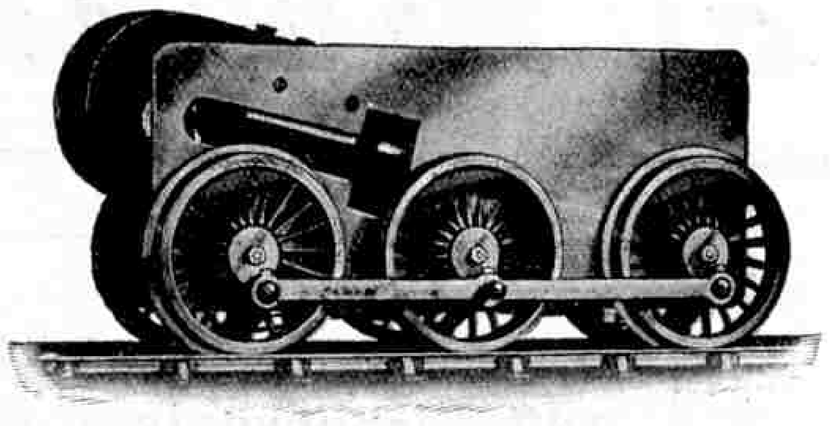
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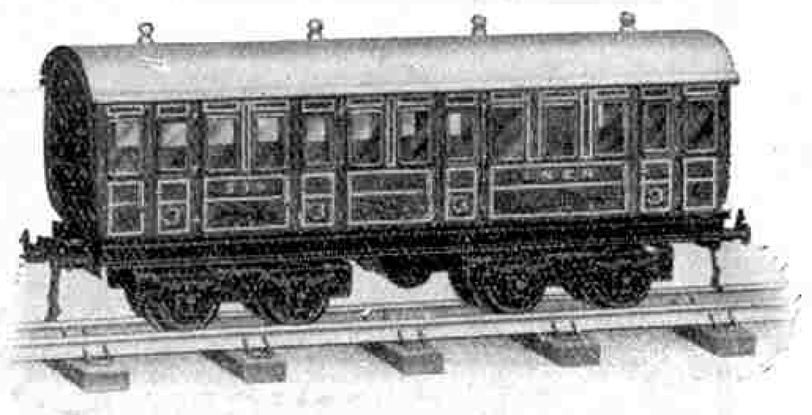
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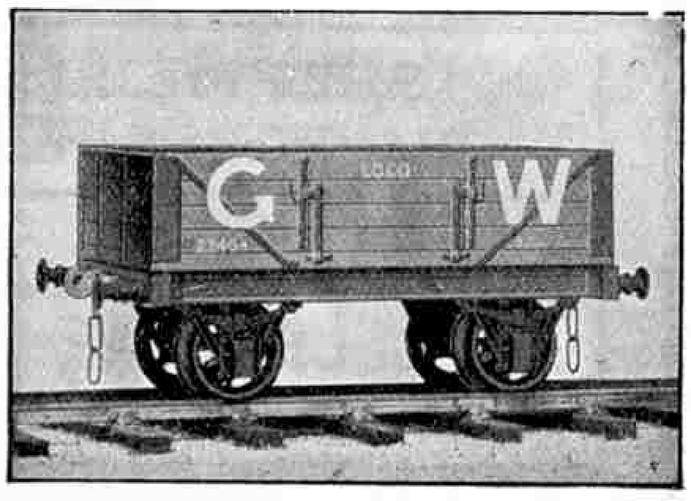
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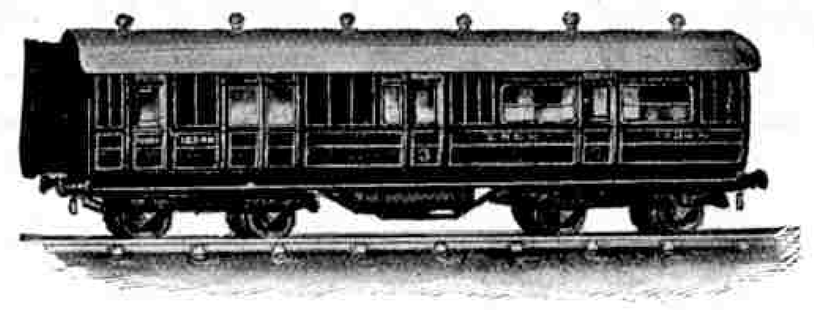
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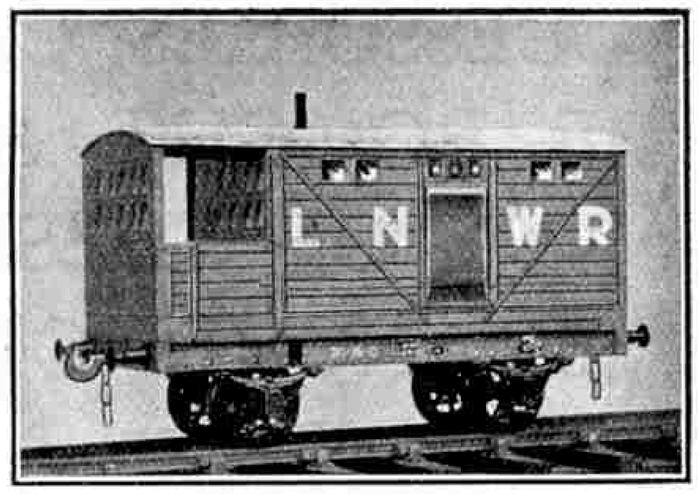
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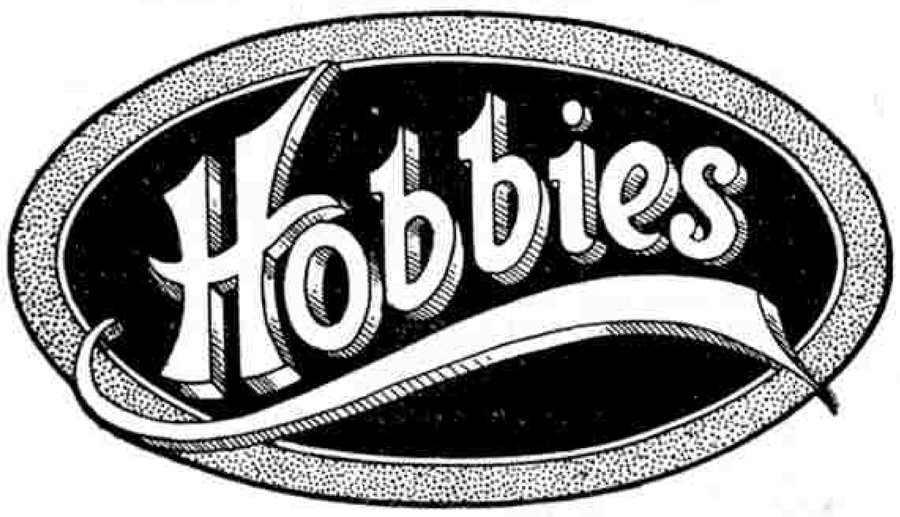
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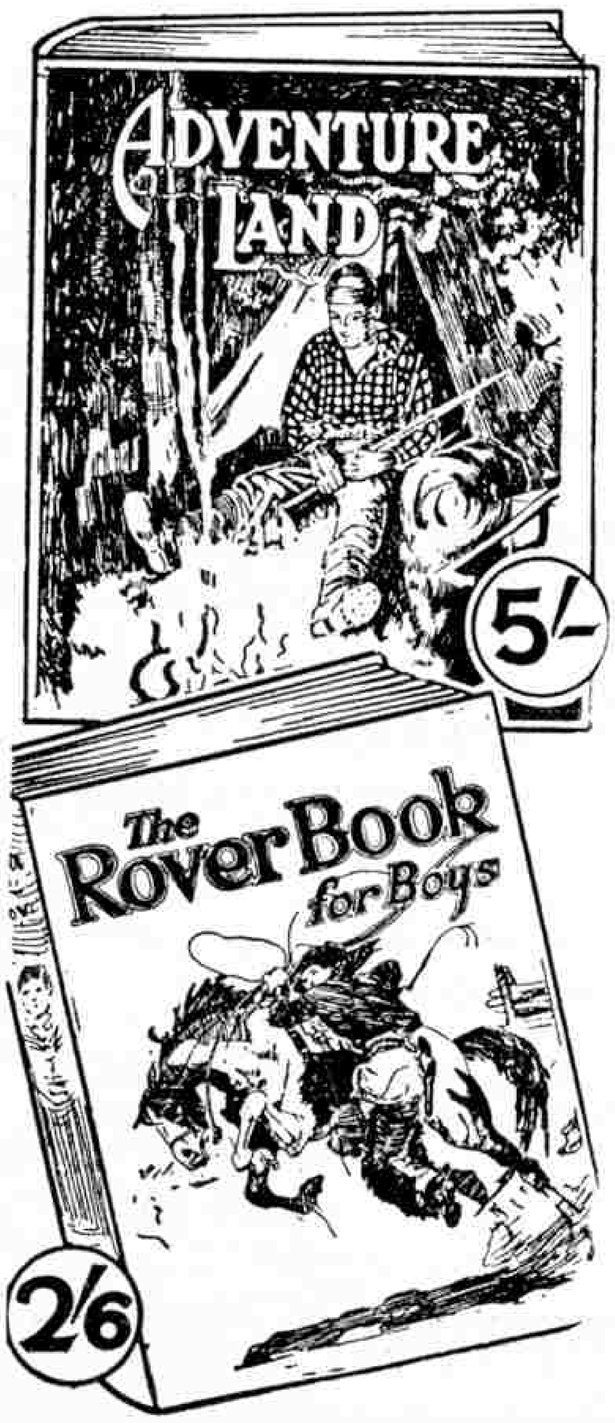
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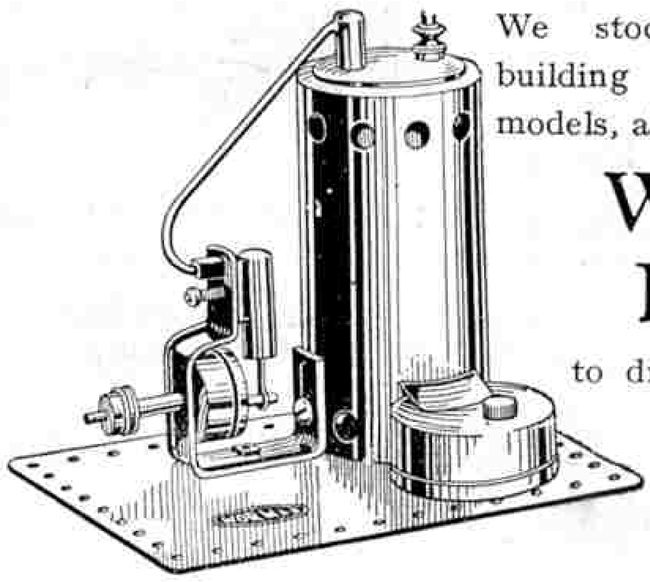
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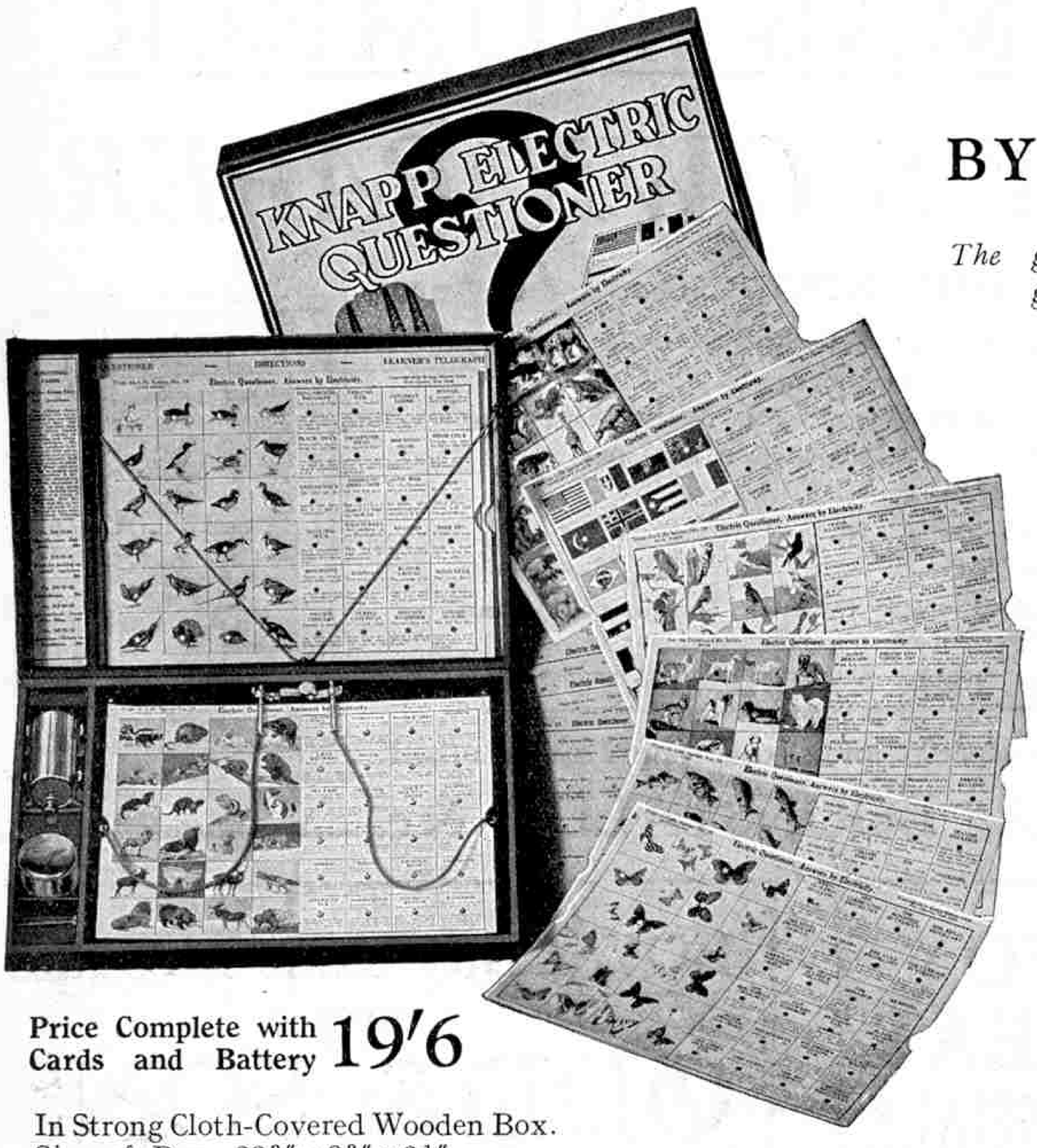
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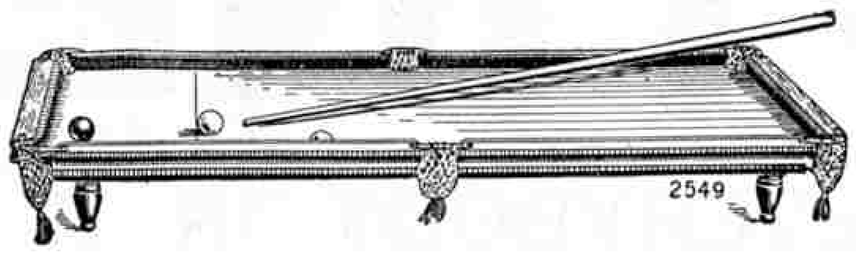
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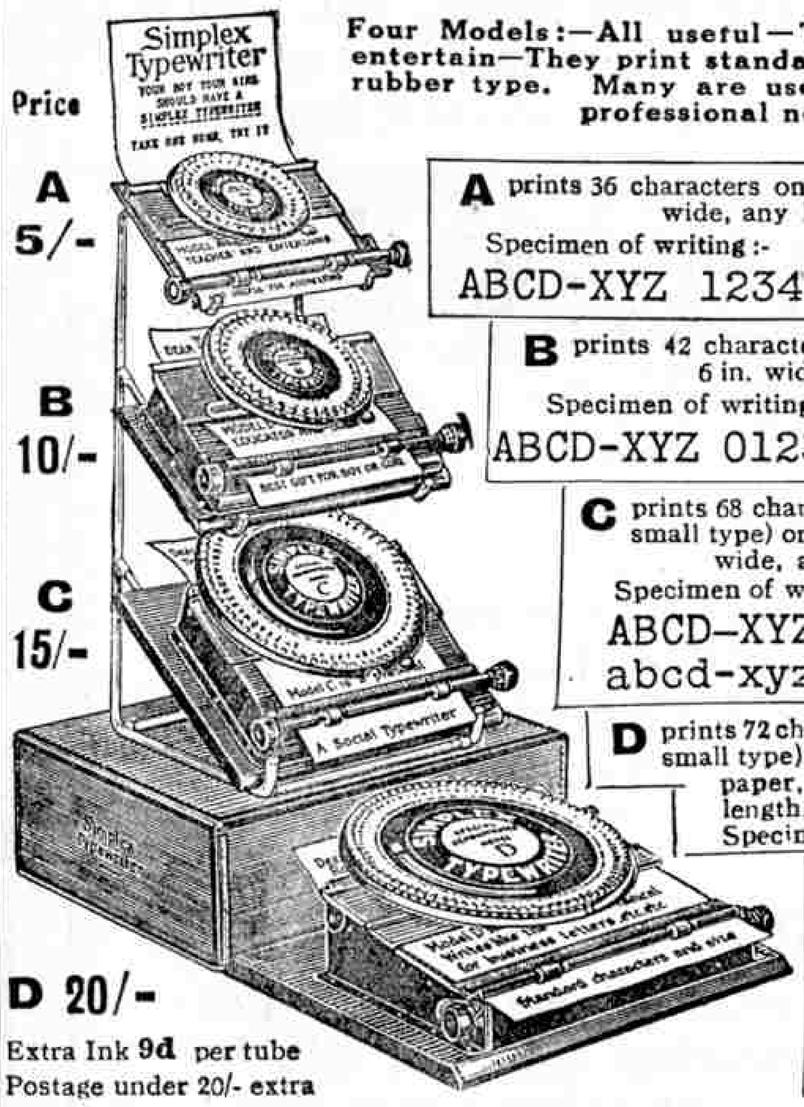
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A prints 36 characters on paper or card 5 in. wide, any length
Specimen of writing :-
ABCD-XYZ 1234567890 .,

B prints 42 characters on paper or card 6 in. wide, any length
Specimen of writing :-
ABCD-XYZ 01234-9 .,?&-£

C prints 68 characters (Capitals and small type) on paper or card, 6 in. wide, any length.
Specimen of writing :-
ABCD-XYZ 01234-9
abcd-xyz .,?-£&

D prints 72 characters (Capitals and small type) on standard business paper, 8 inches wide, any length.
Specimen of writing :-
ABCD-XYZ
abcd-xyz
01234-9
.,?-&/;'$£

Extra Ink **9d** per tube
Postage under 20/- extra

BEST GIFT FOR BOYS and GIRLS

SIMPLEX TYPEWRITERS WRITE—They fit in with the educational idea and hold the child's interest as much as any toy. You can send SIMPLEX TYPEWRITERS to "worth while friends" and know they will appreciate.

Simplex Typewriters are easy to operate. Full Instructions and a tube of Simplex Ink with each machine.

We carry complete stocks of Hornby Trains and Accessories.
Post orders per return.

Our illustrated catalogue is now ready. Post free to "Meccano Magazine" readers.

BARNBY'S LTD.

39, 40, 41, 45, 46, 79 & 80, Great Western Arcade

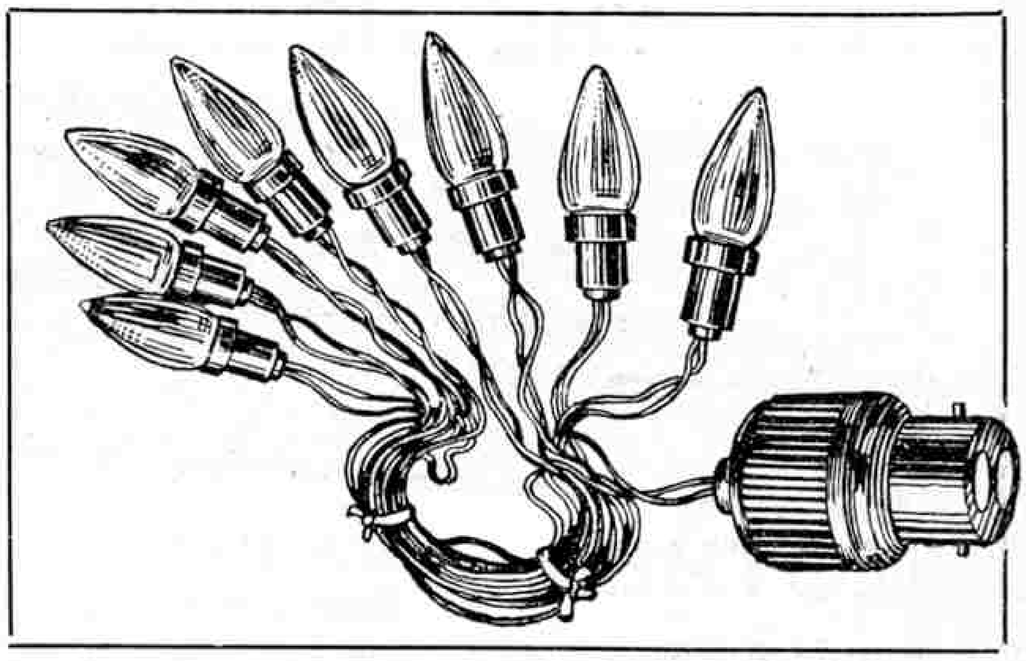
Established over 50 years.

BIRMINGHAM

Christmas Decorations and Novelties

OBTAINABLE AT

— FRANBERS —



Set of 8 110 volts 2 spare lamps 18/- set
,, 16 220 ,, ,, ,, 22/- ,,

Complete as illustrated. Postage free

Satisfaction or money returned in full.

FRANBER & CO.

The Mail Order House for Everything Wireless and Electrical

Send 2d. for Catalogue To-day!

Note New Address—58 BIRCHWOOD CRES., SPARKBROOK, BIRMINGHAM

"EVER-READY"

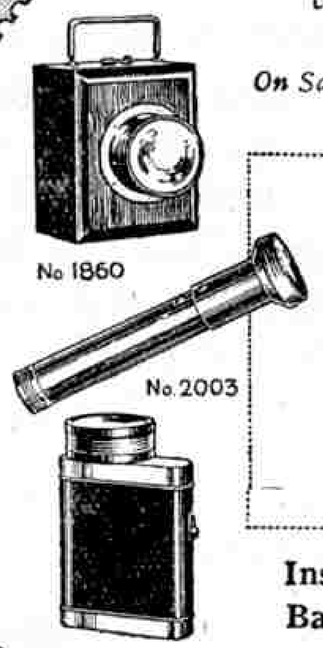
PORTABLE LAMPS & BATTERIES

"Throw a bright light on any subject"

Indoors or outdoors, all the year round, in town or country, there's an **"EVER READY"** to suit all purposes.

BRITISH AND BEST

On Sale by all good-class Stores, Ironmongers and Electricians everywhere.



No. 1860. OAK HAND-LAMP. 2¼" Bull's-eye, Nickel Fittings ... ... Price **10/6**
3-cell Batteries ... ... each **1/6**

No. 2003. "SPOTLIGHT" FOCUSSING TORCH, projects 300 ft. beam Price **10/6**
Large 3-cell Torch Battery each **1/3**

No. 2000. "SPOTLIGHT" POCKET LAMP, Nickel-Plated or Leather Covered Price **3/6**
Standard 3-cell P.L. Battery each **9d.**

Insist on "EVER READY" Dry Batteries for long, efficient service.

Complete Catalogue post free from—

The Portable Electric Light Co. Ltd.

Dept. G.I., 120, Shaftesbury Avenue

LONDON, W.1.

SECCOTINE

(REGD. TRADE MARK)

FOR THE HOUSE AND EVERYBODY IN IT



MOTHER may need the tube for housework a hundred times a day—the long brush handle which insists on coming out can be persuaded by Seccotine to keep its place. Everything broken of wood, leather, bone, paper or cardboard, cloth, can be restored to use by Seccotine—even the boys' clothes can be patched by it. Dry articles thoroughly after repairs.

FATHER if he does a bit of carpentering now and then knows how comfortable it is to know that in the large (9d.) Seccotine Tube he has an adhesive of great power always ready. No heating, no looking for a corkscrew to open a bottle, no difficulty with a locked screw cap, the tubes are stoppered with a galvanized iron spike which draws out with ease. The cone shaped top, with a little pressure at the folded end of tube, places the adhesive just where it is wanted.



GIRLS

have many uses for Seccotine. They repair clothes, mend books, stiffen lace and embroidery. The minor uses are endless and the second size in cartons ($6\frac{1}{2}$d.) can be conveniently kept in the work basket. The pin supplied with each tube when it has pierced the cone, acts as stopper. If the stoppered tube is put back into its carton this can be thrown into the work basket without danger of escape of contents.

BOYS WILL BE BOYS

and boys, if they are worth anything, will always be making something. For the big things they will want a big tube, but for numberless things it will be sufficient to have in the vest pocket one of the little enamelled boxes ($4\frac{1}{2}$d.) illustrated here. And good boys who know when a powerful adhesive is wanted will recommend their fathers to carry the enamelled box in their vest pockets. It is surprising how often in the day the need for an adhesive can be satisfied with the little enamelled box in the pocket.



The word "Seccotine" is a registered Trade Mark. Seccotine is sold everywhere from China to Peru. The shops selling it in the British Islands and France are numberless.

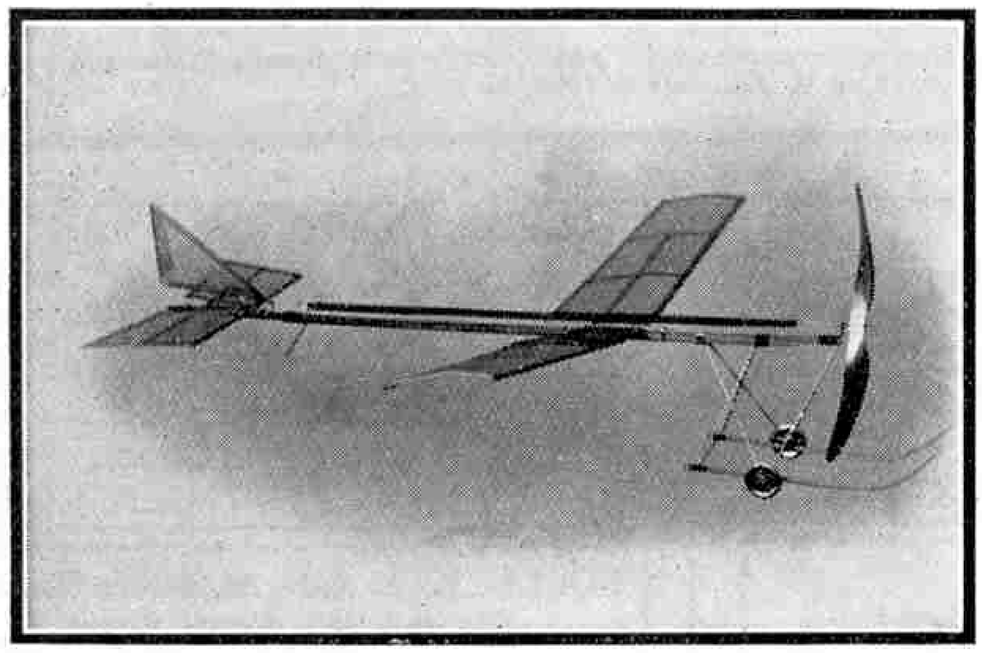
WHOLESALE FROM

M'CAW, STEVENSON & ORR LTD.

THE LINENHALL WORKS, BELFAST

The Ideal Xmas Gift

The "Skisail" Flying Model Tractor Monoplane
THE ALL-SEASONS SPORT



BRITISH MANUFACTURE. **Patent No. 138210**

GUARANTEE. These models show perfect stability in flight, are easy to handle and all sizes are guaranteed excellent flyers.

SPECIFICATION Silver Spruce Fuselage. Silk-covered Planes. Patent Collapsible Chassis. Aluminium Wheels.

The prices quoted will suit all pockets, and as a Xmas Present nothing will give greater enjoyment than one of our "Skisail" Models.

No. 0.	Approx. Flight	450 yds.				Price	21/–
,, 1.	,,	,,	350	,, ...	Can be adjusted to fly in straight or circular flight.	,,	15/6
,, 2.	,,	,,	250	,, ...		,,	10/6
,, 3.	,,	,,	200	,, ...		,,	8/6
,, 4.	,,	,,	150	,, ...		,,	6/6
,, 5.	,,	,,	100	,, ...		,,	4/6

Nos. 0, 1, 2 and 3 fitted with landing skids. Packed in strong box with instructions. Postage 6d. Two sent carriage paid.

See that you purchase "The Skisail" Patent Models. They stand unrivalled in quality and efficiency. Send P.O. direct to:

PATENT MODEL MANUFACTURERS

159, Lymington Avenue, Wood Green, London, N.22.

For Dirty, Oily, Greasy Hands



TEA-TIME! And hands like a nigger through "tinkering" with that new model. Not just dirty, but oily too. Will ordinary soap get it off?

Calvert's Pumice Soap

is just the thing for occasions like this. Specially prepared with fine pumice powder and other grease-removing ingredients, it is as handy as a toilet soap and just as nice to use. Made in a convenient tablet form, it is a great improvement on having to dig your fingers into a tin of ordinary grease removing compound.

If you find any difficulty in getting it locally

Obtainable from Chemists

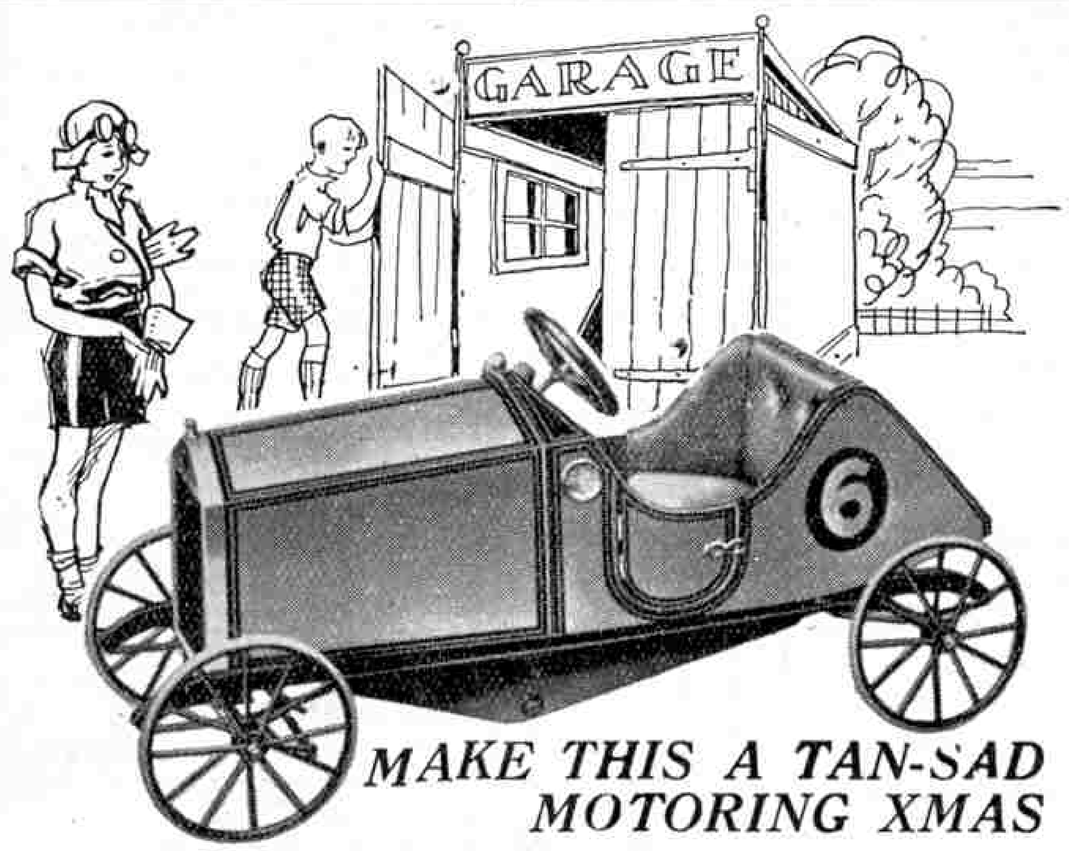
3D PER TABLET



Send 3d for Sample tablet (full size)

to

F. C. CALVERT & CO. (Dept. P.4)
P.O. Box 147
MANCHESTER



MAKE THIS A TAN-SAD MOTORING XMAS

This is one of the new 1926 TAN-SAD Wheel Toys. For real fun—every day—there is nothing like a Tan-Sad motor. Look at the 'Sports' Model illustrated above. It is fitted with speedometer and clock on the dashboard, license holder, mirror and horn. The near side door opens whilst the door panels and bonnet are attractively beaded. Transmission is by double crank pedal movement. Colours:—orange, red and black lined gold with grey radiator - - - Price 65/–

Other models from 21/– to £5/15/–.

Illustrated list post free on request.

TAN-SAD WHEEL TOYS

TAN-SAD LTD., Drake Works, Albert St., BIRMINGHAM

LONDON: 8, Phœnix Place, Mount Pleasant, W.C.1.

for 14/- down a 6ft RILEY 'Home' Billiard Table delivered in your home



Riley's "Home" Billiard Table shown resting on ordinary dining table.

—a real billiard table

built like a full-size table . . . not a toy. The carriage is paid and all risk in transit taken by Riley's.

7 days' free trial enables you to examine and test the table before buying.

This is all you have to do. Simply send a postal order for 14/– and the popular size 6ft. Riley "Home" Billiard Table (to rest firmly and conveniently on your dining table) will be delivered to your door. The table is complete with accessories and ready for play.

The balance of the money you pay monthly as you play. These are the various sizes of Riley's "Home" Tables, together with cash and easy purchase prices.

4 ft. 4 in. × 2 ft. 4 in.	£7	0	0	*or in*	8/6
5 ft. 4 in. × 2 ft. 10 in.	£9	0	0	18	11/–
6 ft. 4 in. × 3 ft. 4 in.	£11	15	0	*monthly*	14/–
7 ft. 4 in. × 3 ft. 10 in.	£15	0	0	*payments*	18/–
8 ft. 4 in. × 4 ft. 4 in.	£21	10	0	*of*	26/–

7 days free trial
Carriage paid & risk taken in transit

RILEY'S COMBINE

BILLIARD AND DINING TABLES
(7 days' free trial)



Riley's Combine Billiard and Dining Table is a beautiful and highly finished piece of furniture, convertible within a few seconds from Billiard Table to Dining Table. Supplied in Oak or Mahogany, any shade, and in various designs. Prices range from **£22 10s.** or can be had in 13 or 20 monthly payments.

Riley's are also the largest makers of Full Size Billiard Tables in Great Britain. Write for prices.

Estimates for repairs and accessories sent Free.

This is the "Cabriole" design 6 ft. size. **£34 10s.** *cash, or in 13 or 20 easy payments.*

E. J. RILEY LTD., **DEAL WORKS, ACCRINGTON,**

and Dept. U, 147, Aldersgate Street, London, E.C.1.

Meccano & Hornby Train Supplies

All the dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Trains and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

ACTON'S SPORTS SUPPLY CO.,
ACTON. EALING.
WIMBLEDON. HARLESDEN.

HARRY BROWN,
1, Moss Lane,
ALTRINCHAM.

J. WOODHALL,
256, Grange Road,
Phone : B'head 621 BIRKENHEAD.

MERCER'S DOLLS' HOSPITAL,
68, Darwen Street,
BLACKBURN.

SELLEN'S BAZAAR,
54, Waterloo Road,
BLACKPOOL, S.S.

BROWN, MUFF & CO. LTD.,
BRADFORD.

W. CARTER,
15, Bridge Street,
opp. Mechanics' Institute, BRADFORD.

JOHN TAYLOR,
28, Preston Street,
Tel. : Brighton 957 BRIGHTON.

GYLES BROS. LTD.,
Tel. 2888 24, Bridge Street, BRISTOL.
188, Whiteladies Road, Clifton, BRISTOL.
Tel. 143

JOHN HALL (TOOLS) LTD.,
BRISTOL. NEWPORT.
CARDIFF. SWANSEA.

SALANSON LTD.,
20, High Street, BRISTOL.
4, High Street, CARDIFF.

SAM TAYLOR,
Silver Street,
Tel. 320 BURY.

HAROLD HUNT,
38, Spring Gardens,
Tel. 202 BUXTON.

A. M. HARRIS,
"Wilces Toy Shop,"
14, High Street Arcade, CARDIFF.

H. W. GILL,
23 & 24, Pittville Street,
CHELTENHAM SPA.

R. H. JEPSON,
1, Cross Cheaping,
COVENTRY.

PURSEY & MOCKRIDGE,
The Sports Outfitters,
Tel. Dartford 173 DARTFORD.

HENRY WHALLEY,
195, Duckworth Street,
DARWEN.

RATCLIFFES TOYERIES,
19, Osmaston Road,
DERBY.

C. E. MELLER,
"Dolls' Hospital,"
DONCASTER.

JOHN ARCHIBALD,
20, Woolcomber Street,
DOVER.

JAMES L. DIXON,
14, Suffolk Street,
(off Grafton St.) DUBLIN.

DIXON'S,
41, High Street,
DUNDEE.

DRAFFEN & JARVIE LTD.,
Nethergate,
DUNDEE.

CARTER'S STORES,
2, Terminus Buildings,
Tel. 953 EASTBOURNE.

BASSETT-LOWKE LTD.,
1, Frederick Street,
EDINBURGH.

WRIGHT'S DOLLS' HOSPITAL,
14, High Street,
ERDINGTON.

UPTON BROS. LTD.,
Sandgate Rd. and Tontine St.,
FOLKESTONE.

HARRY HUBBARD,
8, High Street,
(Opposite the Cricketers) GILLINGHAM.

ROBERT BALLANTINE,
103½, St. Vincent Street,
GLASGOW.

CLYDE MODEL DOCKYARD,
22-23, Argyll Arcade, GLASGOW.
Model Makers to the Admiralty, the Railway Coys., etc.

The MARVEL MART (Wm. Ross & Co.),
110, West Nile Street,
GLASGOW.

POLLOCK & CO., 36, Bridge St. and
222 and 245, Argyle Street
and 39, Paisley Rd. West, GLASGOW.

WELTON & MESSENT,
5, Pond Street,
HAMPSTEAD, N.W.3.

FLETCHER'S TOYLAND,
77, Deardengate, HASLINGDEN.
Grand Building, RAWTENSTALL.

HAMMOND'S LTD.,
Paragon Square,
HULL.

SMITH & DANIELS,
59, Westgate St., IPSWICH.
25, Market Place, GT. YARMOUTH

W. J. S. CARPENTER,
13 & 15, Queen Victoria Street,
LEEDS.

PEARSON & DENHAM (PHOTO)
LTD., 6, Bond Street,
LEEDS.

ROBOTHAM,
"Baby's Kingdom,"
Tel. 4809 LEICESTER.

LLOYD & SON,
2, Station Street,
LEWES.

BYCROFTS EMPORIUM,
366, High Street,
LINCOLN.

C. LUCAS, Hobbies Depot,
35, Manchester Street,
LIVERPOOL.

Reliance Cycle & Motor Co.,
29/31, Manchester St., Liverpool.
Argyle & Conway Sts., Birkenhead.

THE ARUNDEL CYCLE & MOTOR STORE, 52, Church Road, Upper Norwood, LONDON, S.E.19.

Meccano & Hornby Train Supplies

The thirty dealers whose advertisements appear on this page carry full stocks of Meccano Outfits, Accessory Outfits and Meccano parts, Hornby Train and Hornby Train Accessories all the year round. The names are arranged in alphabetical order of town.

W. HUMPHRYS & SON,
Estab. in 1840
269/271, Rye Lane, Peckham, LONDON.

F. R. POTTER & SON,
43, Market Place, LOUGHBOROUGH.

H. G. PARTRIDGE & CO.,
10, Chapel Street, LUTON.
Tel. 234

BARR'S CHILDREN'S PARADISE,
49, Deansgate, MANCHESTER.
Tel. City 165

BAXENDALE & CO. LTD.,
Miller Street, MANCHESTER.
Tel. 5900 City (20 lines)

A. FRANKS LTD.,
95 & 97, Deansgate, MANCHESTER.
90, Bradshawgate, BOLTON.

A. INMAN,
Moorfield Arcade, 105, Lapwing Lane, Didsbury, MANCHESTER.

EDWARD LLOYD,
268, Upper Chorlton Road,
Tel. 613 Chorlton **MANCHESTER, S.W.**

JOHN NESBITT LTD.,
42, Market Street, MANCHESTER.

H. WILES LTD.,
124, Market Street, MANCHESTER.

SHAW'S BAZAARS,
30-36, High Street, MARGATE.

R. SCUPHAM & SONS,
35, Linthorpe Road. MIDDLESBROUGH.

DIBBS' DOLLIES' HOSPITAL,
NELSON, LANCS.

ALFREDS, TOY SHOP,
77, Northumberland Street, NEWCASTLE-ON-TYNE.

WILLIAM OLLIFF,
13, Grainger Street West, NEWCASTLE-ON-TYNE.

THE OXFORD SPORTS DEPOT,
117, St. Aldates', OXFORD.

JANES & ADAMS,
13, The Promenade,
And Branches. **PALMERS GREEN.**

A. J. ROBERTSON,
39-41, Broad Bridge Street,
Tel. 374 **PETERBOROUGH.**

R. MARSDEN & SON LTD.,
115, Church Street,
Tel. PRESTON 1314 **PRESTON.**

DEAN & HOLT,
78, Yorkshire Street, ROCHDALE.

SHEFFIELD PHOTO COMPANY,
6, Norfolk Row (Fargate),
'Phone 3891 **SHEFFIELD.**

A. J. TINKER,
20, London Road, SHEFFIELD.

WILSON, GUMPERT & CO. LTD.,
57, Fargate,
Tel. 489 **SHEFFIELD.**

BIRMINGHAM & COVENTRY CYCLE CO., 140 & 151, Above Bar, SOUTHAMPTON.

OSBORN & CO.,
9, High Street, SOUTHAMPTON.

S. T. SIMPSON & SON,
589-595, Lord Street,
Tel. 999 **SOUTHPORT.**

H. W. GINN,
The London Motor, Cycle & Sports Co.,
Tel. 252 Staines **106, High St., STAINES.**

TAYLOR BROS.,
Great Underbank,
Tel. 630 **STOCKPORT.**

SAXONS LTD.,
29/30, Holmeside, SUNDERLAND.

SPORTS HOUSE **WOKING & WEYBRIDGE.**

METAL CEMENT, repairs defects, 2/6, 3/6, posted.—Albert Feather, White Abbey Rd., Bradford, Yorkshire.

Patents, Trade Marks, Inventions Advice Handbook & Cons. free.—B. T. King, Regd. Patent Agent, 146a, Qn. Victoria St., London, E.C.4. 40 years' refs.

MECCANO ACCUMULATORS.
There is now a 4-volt 20 amp. Meccano accumulator available in addition to the 4-volt 8 amp. accumulator already listed. The price is 25/- (postage 6d. extra).

Set of 12 Railway Postcards—Locomotive Jig Saw Puzzle—72 Railway Picture Stamps and 2 Scale Model Sheets of L.N.E.Ry., Flying Scotsman and latest type Sleeping Car—all sent for **5/-** post free.
THE LOCOMOTIVE PUBLISHING CO. LTD., 3, Amen Corner, LONDON, E.C.4.

MAKE YOUR OWN ELECTRIC LIGHT

ONLY 5/6

Dynamos are wonderful machines—though very simple and easy to work, it's great fun actually making your own electric light, but still greater fun devising the many practical uses to which it can be put. Green dynamos are the last word in



good design—they're right up to date, and low in price too. Our 1927 "De Luxe" model is only 5/6, post 6d. (Reduced from 7/6). Send for one now! Delivery by return of post. (Postage abroad 1/6).
GREENS (Dept. E.N.), 14, New Oxford St., London, W.C.1

ONLY 5/6

GOOD THINGS IN STORE

HOBBIES FRETWORK Outfits
from **2/6** to **30/–**

MECCANO OUTFITS } Everything
HORNBY TRAINS } in stock.

BASSETT LOWKE'S Model Trains.

STUART TURNER'S Engines.

Trains can be tried on our track.

WIRELESS Outfits and Parts.
We have a wonderful selection from one to five valve sets.

Write for Price Lists.

Special offer to Meccano Boys :

8 Samples of Aniline Stains for wood staining, post free for **1/6.**

8 Beautiful transfers, various, including 1 pkt. transfix and instructions. Post free for **1/6.** Now finish the job nicely.

C. LUCAS
Hobbies Depôt
35, Manchester St., Liverpool



MODELS !

There is no better material for the building of Small Models of Stations, Bridges, Houses and Scenic Settings for Model Railways than

HARBUTTS PLASTICINE

It is made in 10 colours, is Clean and Plastic. It will hold firmly together various kinds of materials, and makes excellent stands for various forms of vegetation, lakes and ponds can be formed without fear of the water soaking away. Send 1½d. stamp for free samples and full particulars—or the

Rainbow Box 9d. Post Free 1/1
Builder Boxes—with Brickmaker Tools, etc., 4/3 and 8/3 post free.

Ask for particulars of

NOVLART and STENCIL-ART
for making your own Xmas Cards.

HARBUTT'S PLASTICINE LTD.,
99, BATHAMPTON, BATH.

The No. 2 Pullman, one of the fine Hornby Trains



Run Your Own Railway

All boys interested in the construction and running of model railways will find everything they require in our display. We have over 60 ft. of track laid down for demonstrations. Your inspection is invited.

Hornby Trains

We stock a splendid and complete selection of these magnificent trains and accessories.



Meccano Outfits and Parts.

Agent for Bassett-Lowke Model Railways. Catalogue 6d. each. Also Leeds Model Co., Trains and Accessories. Catalogue 1/– each.

HOBBIES STEAM LAUNCHES

Arundel Cycle Stores,
52, Church Road,
Upper Norwood,
London S.E.
Tel.: Sydenham 2482.

Raleigh Cycles from **£6/17/6**
Humber Cycles from **£6/10/–**
B.S.A. Cycles from **£5/19/6**

ROLLER SKATES



Like **Meccano** and **Hornby Trains** they are still as **popular** as ever with all **healthy boys and girls.**

Many years of wear can be got out of them as they are **adjustable** to any size.

We sell the **best make** only, yet our **Prices** are the **lowest** in the trade.

No. 3 with Threaded Clamps and Case-hardened Steel Wheels ... 5/– pair
No. 5 with Best Ball-Bearing Wheels, as illustrated ... ... 10/– ,,
No. 6 with Best Ball-Bearing Wheels and Block Heels ... ... 11/– ,,

Postage and Packing 1/–. Colonies and Abroad 5/–

Bateson's Sports Depôt, Blackpool



SAFETY PISTOLS AND REVOLVERS

Can be bought, sold, and carried without permit of any kind.

PISTOLS.

No. 4. Small Nickel Pistol with extracto and cartridge cover, solid barrel and top vent holes **2/3**
No. 8. Medium Size, heavier model, nickel as above **2/11**
No. 12. Long barrel, 8" over all, nickel finish, etc. **3/11**

REVOLVERS.

No. 682. 6 Chambers, blue or nickel, solid barrel, top vent holes, perfectly sound and fool proof **7/6**
No. 721. Ditto, in better finish, nickelled solid frame **9/-**
No. 550. 8 Chamber, blue or nickel, heavier pattern **9/11**

BLANK CARTRIDGES.

50 in Box ... ... **9d.**
100 ,, ... **1/3**

Postage on Pistols or Revolvers, 6d.

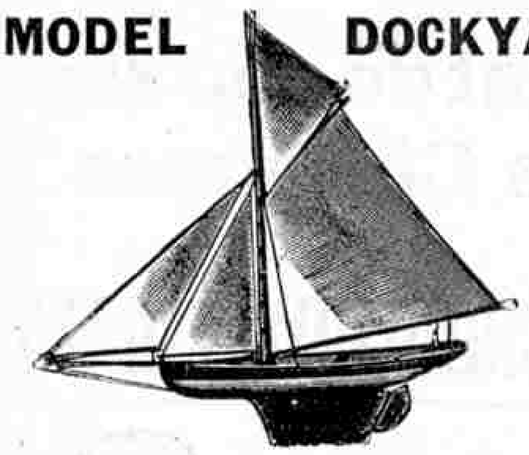
H. H. Parson (Pistol Dept.), 55, Northcote Rd., S.W.11

CINEMA FILMS. 1/– 100 ft.; 6/– 1,000 ft.; d/d.—Phillips, 64, Ewert Street, Brighton.

CINEMATOGRAPH FILMS, cheap. British-made Machines and Cinema Accessories.—Filmeries, 57, Lancaster Road, Leytonstone, London.

Home Cinematographs, Films, Cheap. Join our Film Library, Lists.--Pictures, 109, Kenlor Rd., Tooting.

KENSINGTON MODEL DOCKYARD



Sailing Yachts & Fittings

HOBBIES STEAM LAUNCHES
HORNBY TRAINS
MECCANO OUTFITS AND PARTS
WORMAR STEAM ENGINES

Novelties for the Xmas Season. Also a High-class Selection of
TABLE and POCKET CUTLERY.
REQUISITES for FOOTBALL, FISHING, HOCKEY and all OUTDOOR SPORTS.

Accumulators	Kodaks and Films
Aeroplanes and Parts	Lott's Bricks
Air Guns	Magic Lanterns
Archery Sets	Marine Engines
Boat Motors	Microscopes
Boxing Gloves	Model Farms
Chemical Cabinets	Model Soldiers
Chess and Draughts	Opera Glasses
Cinematographs	Parlour Games
Clockwork Trains	Skates (Roller & Ice)
Engine Fittings	Scooters
Fret Outfits	Safety Pistols
Fountain Pens	Telescopes
Fairy Cycles	Typewriters
Ingersoll Watches	Wireless Sets

Electric Lamps, Bulbs and Refills

Send 1½d. Stamp for List "M."

C. H. LORBERG
185, Kensington High St., London, W.8.

SEND FOR
BOND'S 1927 MODEL LIST
4d. Post Paid

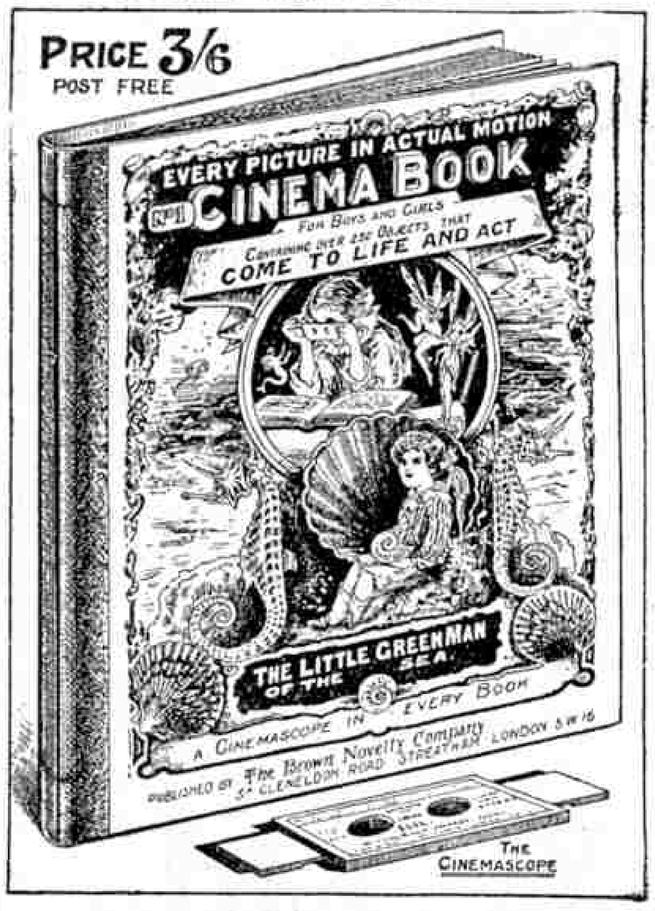
64 pages filled with details of
MODELS, MODEL RAILWAYS and parts for making MODELS
All about BOND'S Famous
SCALE MODEL STEEL RAILWAY TRACK
in 3 ft. lengths.
Gauge 0, 4d. per length. Gauge 1, 5d. per length.
Also in BRASS at 6d. per length.
Chairs, Sleepers, Fishplates, Points.
Also BOND'S 00 RAILWAY TRACK.
A correct Bull-Head Rail for Miniature Railways. Simple and Cheap to Build.



Rail, per 12" length, 2d. Sleepers, per 100, 1/4
Chairs, per 100, 1/4 Fishplates, per doz., 6d.
Spikes, per packet, 2d.
The TRY-OUT BOX will build 3 feet of complete Track, with Laying Tool **3/-** Post 3d.
BOND'S LTD., 254, Euston Rd., LONDON, N.W.1
'Phone: Museum, 7 37.

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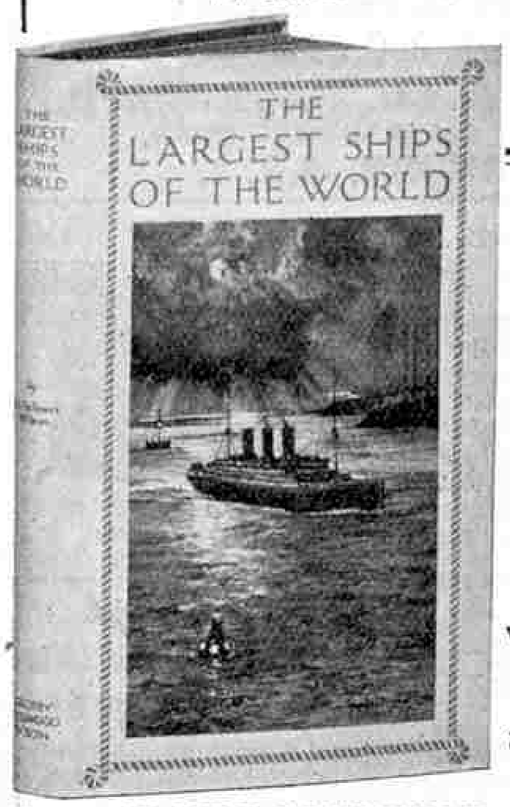
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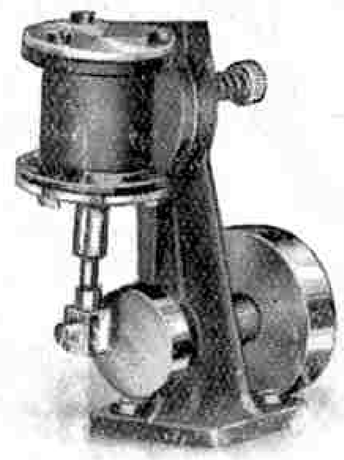


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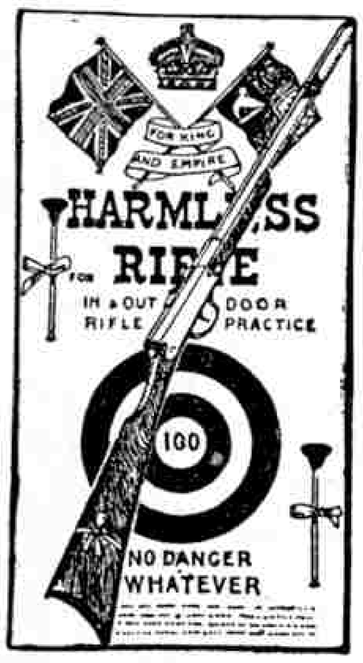
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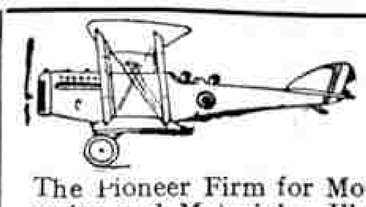
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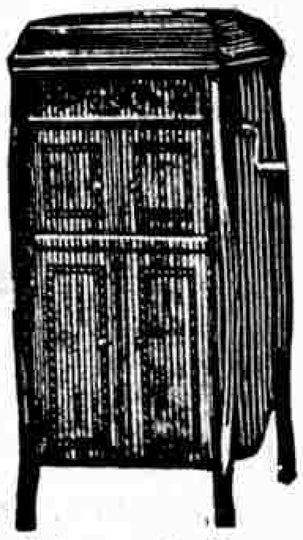
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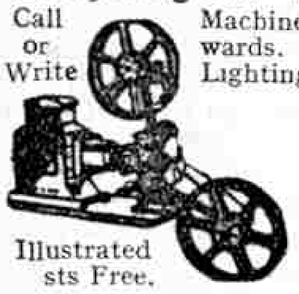


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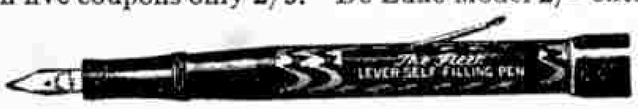
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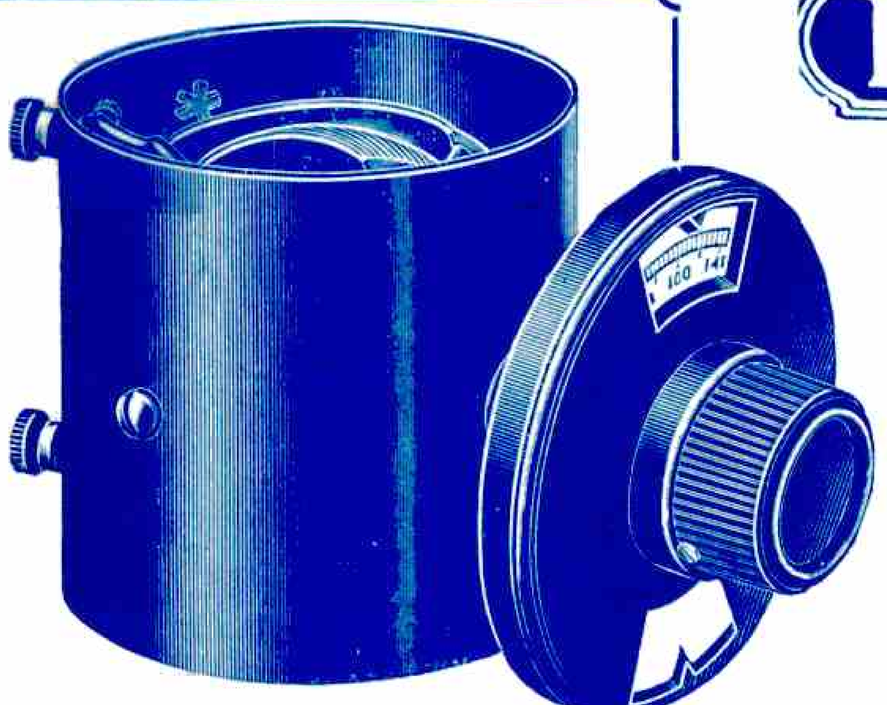
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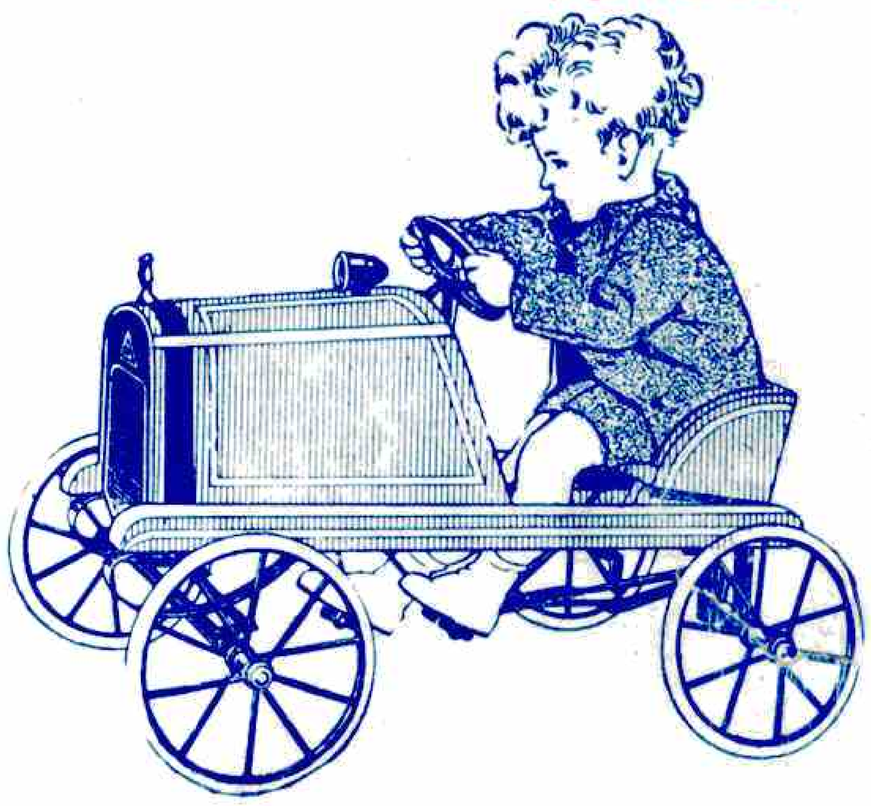
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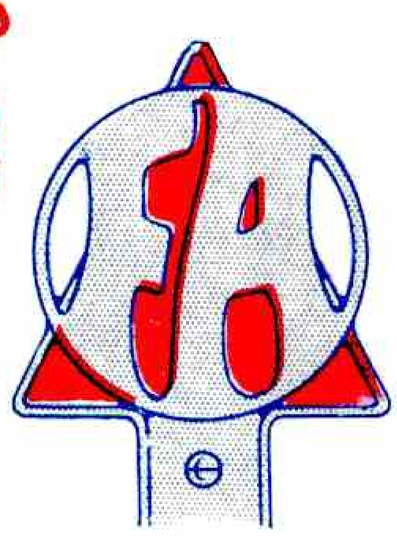
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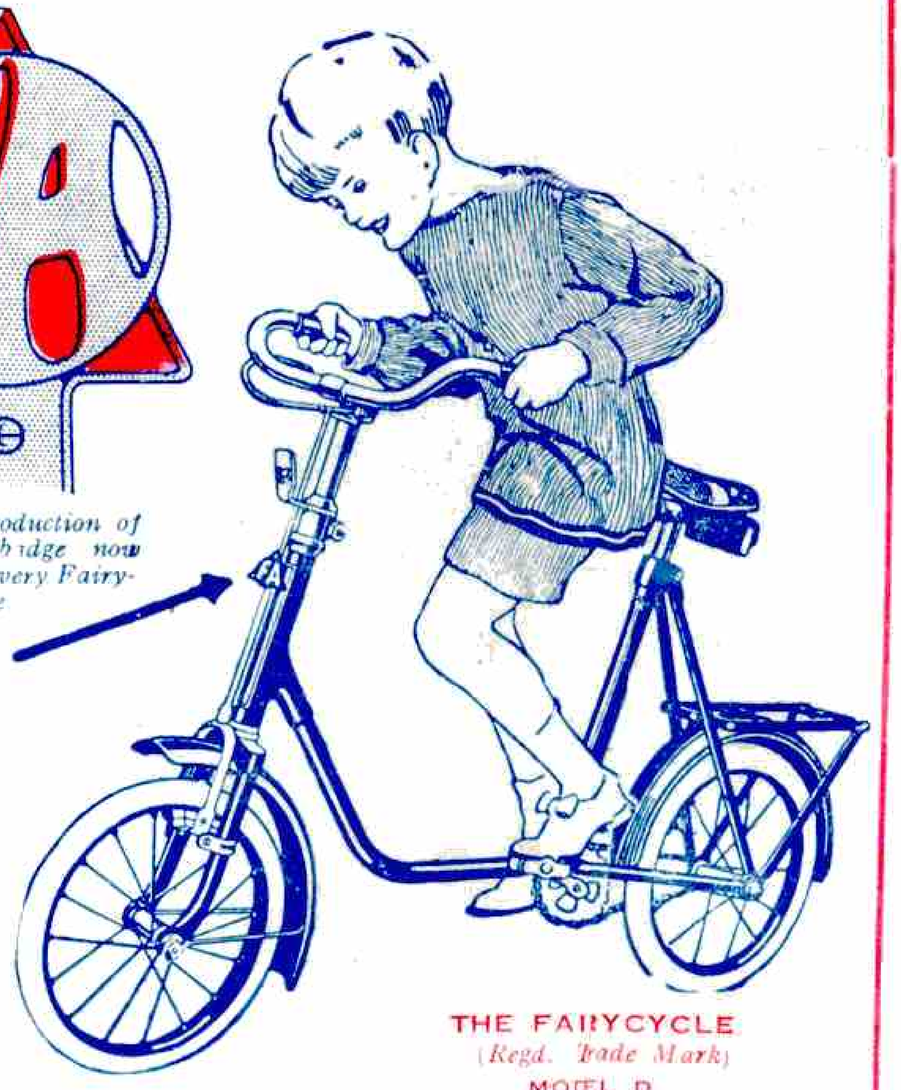
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